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CONSOLIDATION.

THE Junction and Breakwater, the Breakwater and Frankford, and the Worcester Railroad Companies have been consolidated under the name of the Delaware, Maryland and Virginia Railroad Company. The main line now extends from Franklin, Va., to Harrington, Del., the line to Lewes and Rehoboth being a branch. The directors of the consolidated company, elected on the 1st inst., are: N. L. McCready, John M. Robinson, Thomas Baumgardner, J. Bodine, J. W. Causey, J. T. Long, Harbeson Hickman, E. W. Tunnell, G. W. Carrington, George W. Purnell, Geo. W. Bishop, E. K. Wilson, E. W. Houston. The officers are: Thomas Groom, superintendent, D. H. Houston, treasurer, H. S. Marshall, auditor, John L. Mapes, engineer of roads and bridges, and A. Brown, traffic agent. The office of the company will be at Georgetown, Del. The lines, which run in and through four Peninsular counties, have an aggregate length of 101 miles, the Junction and Breakwater, including the branch to Lewes and Rehoboth, being 45 miles, the Breakwater and Frankford 20 miles, and the Worcester 36 miles.

THERE were filed at Harrisburg, Penn., on the 1st inst., articles of merger and consolidation between the Philadelphia, Norristown and Phoenixville, the Phoenixville, Pottstown and Reading, and the Phoenixville and West Chester Railroad Companies, extending from Philadelphia to Reading, under the control of the Pennsylvania Railroad Company, and to be known as the Pennsylvania Schuylkill Valley Railroad Company. The capital stock is \$4,500,000. J. N. DuBarry is president of the consolidated company.

ORGANIZATION.

At the annual meeting of the stockholders of the Northern (N. H.) Railroad Company, held on the 31st ult., the following directors were re-elected for the ensuing year: Henry C. Sherburne of Concord, George W. Nesmith of Franklin, Uriel Crocker of Boston, Francis B. Hayes of Boston, Josiah H. Benton, Jr., of Boston, George E. Todd of Concord, Alvan W. Sulloway of Franklin, Uriel Crocker of Boston, Wyman Pettee of Enfield and Wm. P. Wilson of Lexington were appointed auditing committee for 1884. The directors organized by choosing Henry C. Sherburne president, and William L. Foster clerk.

The directors of the Montpelier and Wells River Railroad Company, elected on the 31st ult., are: D. R. Sortwell, Cambridge, Mass.; S. S. Thompson, Lyndonville, Vt.; W. H. H. Bingham, Stowe, Vt.; Joel Foster, Montpelier; S. C. Shurtleff, Montpelier. The officers are: D. R. Sortwell president, S. S. Thompson vice-president, Joel Foster clerk, Fred. W. Morse general passenger agent and treasurer, W. A. Stowell general superintendent, S. C. Shurtleff attorney.

THE directors of the Pacific Mail Steamship Company, elected on the 30th ult., are: Jay Gould, Sidney Dillon, Russell Sage, C. P. Huntington, E. H. Perkins, Jr., Henry Hart, William Remsen, Edward Lauterbach, J. B. Houston. The officers are: President, J. B. Houston; secretary, W. H. Lane; treasurer, J. Hellen. Executive committee, Jay Gould, Russell Sage, C. P. Huntington, Henry Hart. Auditing committee, Sidney Dillon, E. Lauterbach, Wm. Remsen.

At the first annual meeting of the Canada Rolling Stock Company, recently held in St. John, the following directors and officers were elected: Robt. Thomson, of Stratford, Ontario, president; Robt. Marshall managing director and treasurer; Magnus Sabiston, Jas. Alfred Clark and James Rourke, directors; Robt. Marshall secretary. The capital stock of the company is increased from \$80,000 to \$450,000.

At the annual meeting of the Manchester and Lawrence Railroad Company, held Manchester, N. H., on the 25th ult., the following directors were elected: Benjamin F. Martin, Nathan Parker, Manchester; Asa Fowler, Edward A. Abbott, John A. White, Concord; Jos. W. Smith, Andover, Mass.; Wm. A. Tower, Boston. The directors elected Benjamin F. Martin president, and Samuel N. Bell clerk.

At a meeting of the stockholders of the Nashua and Lowell Railroad Company, on the 30th ult., the following board of directors was elected: Francis A. Brooks, Francis E. Parker, Sidney K. Richardson of Boston; H. M. Shaw of Lebanon; J. W. White, C. V. Dearborn, W. W. Bailey of Nashua; Charles B. Brooks of Boston, treasurer; W. A. Lovering of Nashua, clerk.

THE officers of the Railway Car Accountants' Association, recently elected, are: Asa P. Blakeslee of the Lehigh Valley Railroad, president; W. A. Moody of the Richmond and Danville Railroad, vice-president; F. M. Luce of the Chicago and Northwestern Railroad, secretary, and H. H. Lyon of the Chicago and Alton Railroad, assistant secretary.

THE directors of the United Railroad and Canal Company of New Jersey, elected on the 31st ult., are: John Jacob Astor, John C. Banon, Joseph D. Badle, William Bucknell, A. L. Dennis, Charles E. Green, F. W. Jackson, Robert Lenox Kennedy, Thos. McKean, John G. Stevens, R. F. Stockton and Samuel Welsh.

THE directors of the West Jersey Mail and Transportation Company, elected on the 30th ult., are: John G. Stevens, George M. Wright, Thomas J. Yorke, R. C. Nichols, William E. Potter, T. U. Harris and Thomas N. Adams. T. U. Harris was elected president and J. C. Voorhees secretary.

THE directors of the Wilton Railroad Company, elected on the 30th ult., are: Solomon Spalding, Clark C. Boutwell, William T. Ramsdell, John Reed, John A. Spalding of Nashua; Harvey A. Whiting of Wilton, clerk; Frank A. McKean, treasurer.

CONSTRUCTION.

PRESIDENT GOWEN of the Philadelphia and Reading Railroad Company, is reported to have said that the Jersey Shore, Pine Creek and Buffalo Railroad would be opened for business by the 18th of June. The new Clearfield road is to be opened some time during the coming winter, and the Vanderbilt line to Pittsburgh will be completed within two years. The Baltimore and Ohio's new line between Philadelphia and Baltimore, it is expected, will be completed within sixteen or eighteen months.

THE General Passenger Agents of the East Tennessee, Virginia and Georgia and the Louisville and Nashville Railroad companies announce the completion and opening of the Short Line between Louisville, Ky., and Knoxville, Tenn., composed of the Louisville and Nashville Railroad, Louisville to Jellico (Kentucky State Line), 201 miles, and the East Tennessee, Virginia and Georgia Railroad, Jellico to Knoxville, 66 miles, shortening the distance between Louisville and Knoxville 157 miles.

THE Oregon Short Line Railway has been completed to a point twenty-two and one-half miles west of Shoshone. The distance from Granger on the line of the Union Pacific to Shoshone is 322 miles. In addition, a branch fifty-seven miles long, from Shoshone to Hailey, on the Wood River, is in operation. The Short Line will be completed through a connection with the Oregon Railway at Snake River by the 1st of January.

THE survey of the Sussex (Del.) Midland Railroad, the charter for which has passed into the hands of Jerome Bradley, of New York, was commenced on the 4th inst. The road is to be completed from Georgetown to Bridgeville within a year. The starting point at Georgetown is about a fourth of a mile north of the depot of the Delaware, Maryland and Virginia Railroad.

THE Arizona Mineral Belt Railroad, a Boston enterprise, is being surveyed from Winslow, on the Atlantic and Pacific Railway, to Globe City, Ari., with the view of ultimate extension to the junction with the Southern Pacific at Benson. The road, it is believed, will be an available feeder to the Atlantic and Pacific.

THE Chicago, Milwaukee and St. Paul Railway Company has decided to build a line into Kansas City. It will go from Ottumwa via the Chillicothe route, the company building a bridge over the Missouri above Wyandotte. The road will be in operation by the first of the year after next.

CONSIDERABLE progress is being made in the surveys of the Ottawa, Waddington and New York Railway. The company intend bridging the Ottawa River at the lower end of the city of Ottawa, connecting with the Canadian Pacific and the proposed Gatineau Valley Railway at Hull.

THE two ends of the Nicholson tunnel on the Delaware, Lackawanna and Western Railroad, near Factoryville, Penn., have been connected. The completion of the tunnel removes the last barrier to a double track on the Delaware and Lackawanna Railroad between New York and Buffalo.

THE line of the Natchez and Northwestern Railroad Company, which is asking local aid from the parishes on the line in Louisiana and the counties in Arkansas, extends from the Mississippi River, opposite Natchez, to Pine Bluff, Ark. It is to be a narrow-gauge road.

THE President has accepted the twenty-five miles of the Northern Pacific Railroad, recently constructed, and examined by a special commission. The section accepted extends from the 325th to the 350th mile east of Wallula Junction, Washington Territory.

THE New Brunswick Railway Company, which has obtained a 999 years' lease of the St. John and Marine Railway, will take possession on the 1st of July. It is said the company expect to extend the line from Edmonton to River Ouelle this year.

THE Baltimore and Potomac Railroad now has a double-track

all the way from Baltimore to Washington, and trains are now run through from Philadelphia to Washington without changing crew or engine.

TRACK-LAYING was commenced on the 31st ult., on the Live Oak, Tampa and Charlotte Harbor Railroad, which will extend from Branford to Charlotte Harbor, Florida.

THE Wisconsin Central Railroad Company is making preparations to complete the extension of the road from Chippewa Falls, Wis., to St. Paul this season.

MINOR KEITH has presented a proposition to the Costa Rica Congress to continue the Simon Bay and Rio Lucio Railroad to the capital, San José.

THE extension of the St. Paul, Minneapolis and Manitoba railroad, from Bartlett to Creel City, is to be finished by July 1, and opened on July 4.

THE work on the Russellville and Dardanelle (Ark.) Railroad is progressing rapidly. The managers hope to finish grading by the 1st of August.

THE contractors are hard at work completing the section of the Quebec and Lake St. John Railway, from St. Raymond to Lake Simon.

THE Jacksonville, St. Augustine and Halifax River Railroad was completed to St. Augustine, Florida, on the 19th of May.

THE New York Central Railroad between Rochester and Suspension Bridge is to be double-tracked.

INCORPORATION.

ARTICLES of incorporation were filed on the 1st inst. with the Secretary of State at Albany, of the Brooklyn and Long Island Trunk Railroad Company, with a capital of \$5,000,000. The incorporators are: Austin Corbin, Islip, L. I.; J. Rogers Maxwell, Brooklyn; Henry W. Maxwell, Brooklyn; Henry Graves, Orange, N. J.; E. B. Hinsdale, New York; James D. Campbell, Davenport, Iowa; Edward E. Sprague, Flushing, L. I.; Edwin H. Atkins, Brooklyn; W. T. Wild, Jersey City; J. K. O. Sherwood, Glen Cove, L. I.; Thomas F. Wood, New York; W. G. Wheeler, New York; and Charles Bruff, Brooklyn. The company was subsequently organized by the election of Austin Corbin president, Anthony Jones engineer, and the following board of directors: Austin Corbin, J. Rogers Maxwell, Henry W. Maxwell, Thomas F. Wood, J. D. Campbell, J. K. O. Sherwood, Charles Bruff, E. B. Hinsdale, and W. G. Wheeler. A map and profile of the proposed route of this road was filed in the office of the Register of Kings County on the 2d inst. The route is described as follows: Beginning at the depot grounds which extend from High to Nassau street, and from Washington street to Snell's alley, it will curve from Nassau street toward Washington street, which it crosses about half way between Nassau and Concord streets. It crosses Concord street about one-third of the block east of Washington street, and crosses Adams street half way between Concord and Tillary streets. It crosses the junctions of Tillary and Pearl streets, Jay and Johnson streets, and Myrtle avenue and Lawrence street, taking off the four corners at each junction. Bridge street is crossed about two-fifths of the block from Willoughby street, and the latter street is crossed where it intersects Duffield street. Gold street is crossed half way between Willoughby street and DeKalb avenue. The route crosses Prince street at its junction with Fleet street and DeKalb avenue, near Debevoise Place, and then runs across Fulton street at Nevins street and into Flatbush avenue, through which it runs to the depot of the Long Island Railroad and through Atlantic avenue to the county line. Mr. Corbin says that he purposes to run his cars across the Bridge, using the endless cables, and then by the elevated roads in this city to Harlem. The estimated cost is \$1,000,000 a mile. The land, 60 feet wide, is to be condemned and taken under the General Railroad Law. The road is to be an elevated one.

A CHARTER has been granted by the British Columbia Parliament to the Columbia and Kootenay Company for the purpose of building a railroad from Kootenay Lake to the Columbia River, near the mouth of the Kootenay River; also to run steamboats on the Columbia between the terminus of its railroad and the crossing of the Canadian Pacific near Eagle Pass.

THE Cambridge and Seaford (late Dorchester and Delaware) Railroad Company has been organized with a capital of \$500,000. The road extends from near Oak Grove, Del., to Cambridge, Md., 27.28 miles, and is a branch of the Delaware Railroad. A controlling interest is owned by the Philadelphia, Wilmington and Baltimore Railroad Company.

A BILL has passed the House of Representatives of Rhode Island incorporating the Olmstead Air Line, or New York and Boston Shore Line Railway Company, with authority to purchase or lease the Boston and Providence Railroad. Its route from New York is via New Haven and Norwich to Providence and thence to Boston.

THE Cleveland Railroad Construction Company, of Cleveland, Ohio, has been incorporated with a capital stock of \$560,000.

PERSONAL.

S. D. REEVES has received the appointment of superintendent of the St. Louis and Kansas City Divisions of the Chicago and Alton Railroad, with headquarters at Rood House, Ill., in place of T. M. Bates, promoted to the position of superintendent of transportation. W. E. Gray has been appointed assistant superintendent of the Kansas City Division of the same road, with office at Slater, Mo.

L. H. ROBINSON, of Milford, Pike County, Penn., has been chosen a director of the Philadelphia and Reading Railroad Company, vice Eckley B. Coxe, resigned. It is said that Mr. Robinson will represent the Vanderbilt interest.

ALEX. BRENDSON, of Philadelphia, has been elected president of the West Virginia Central Railway Company. The president and secretary are authorized to take necessary action in commencing operations upon the road.

A. B. BARNARD has been appointed supply agent of the Kansas City, St. Joseph and Council Bluffs Road, with headquarters at St. Joseph, Mo., and he will have charge of all material and supplies, and their distribution.

J. C. WILLIAMS has been appointed general superintendent of the Chicago and Atlantic Railroad, with headquarters at Chicago, Ill. The duties of chief engineer of this company devolve upon Samuel H. Doty.

T. W. SPENCER, engineer of the Rochester Division of the New York, West Shore and Buffalo Railroad, has been appointed chief engineer of the State Railroad Commissioners.

WILLIAM IRVING has been appointed general purchasing agent of the Chicago, Burlington and Quincy Railroad Company, with headquarters at Chicago.

JOHN ORTTON has been appointed master mechanic of the Eastern Division of the New York Central Railroad, with headquarters at Albany.

B. D. WEBBER has been appointed freight agent for New England, of the Quebec, Ottawa and New England Air Line Railway Company.

EDWARD B. WALL has been appointed superintendent of motive power of the Pittsburgh, Cincinnati and St. Louis Railway.

C. H. GLASS has been appointed auditor of the Pittsburgh Division of the Baltimore and Ohio Railroad Company.

E. H. HARRIMAN, of New York, has been elected a director of the Illinois Central Railroad Company, vice A. G. Dalman.

J. VOLK, has been appointed superintendent of construction

of the Oregon and California Extension of the Northern Pacific Railroad.

W. R. BAKER has been appointed general superintendent of the Manitoba and Northwestern Railway.

H. N. TURNER has been appointed general freight agent of the Boston and Lowell Railroad Company.

ALBERT KLINE has been appointed auditor of the Pittsburgh and Western Railroad Company.

GABRIELLE GUSTAV VALENTINE, a noted German physiologist, is dead.

For the past three months the Pennsylvania Steel Company has been making arrangements with its old two-converter plant at the works near Harrisburg, Pa., to thoroughly test the value of the Thomas-Gilchrist process for the manufacture of steel, otherwise known as the basic steel. The samples of the basic steel that were tested gave results that were exceedingly satisfactory, and the steel was shown to be equal and, in a number of respects, superior to the steel previously made at the works by the Bessemer process.—*Pat. Office News.*

CORRESPONDENCE.

[COMMUNICATIONS are solicited for this department on all subjects pertaining to Railroads, Steam Navigation, Machinery, Manufactures, etc. No attention will be paid to communications unless the name and address of the writer is furnished us, though if desired, they will be withheld from publication. We assume no responsibility for statements made by correspondents, and we do not necessarily endorse ideas advanced by them. Under these conditions we think it of value to our readers to devote a liberal space to the free discussion by others—whose opinions may be at variance with our own—of subjects pertinent to this department of the AMERICAN RAILROAD JOURNAL.]

Editor American Railroad Journal:

THE Montreal Gazette of May 18th, contains an account of a trip of a freight train on the Canada Atlantic Railway, from Ottawa to Coteau. The account stated that the load consisted of 450 net tons of line freight hauled by a single locomotive with cylinders 16x24, against grades of thirty feet per mile.

This was such an unusual performance that I have made further inquiries about it, and I find, to my surprise, that it was even better than described. It appears that the train consisted of forty cars, and the gross weight of the train, exclusive of the engine, was 792 net tons. This was of course an unusual performance, but the most surprising feature of it was not mentioned by the reporter of the Gazette. It seems that this train was hauled over an undulating country, from Alexandria to St. Polycarpe, a distance of nineteen miles, in fifty-five minutes, including one stop of several minutes at an intermediate station; certainly this was a remarkable performance.

The writer in the Gazette seems to attribute the result mainly to the constructive ability of the engineer and contractor, Mr. D. C. Linsley. As to Mr. Linsley's skill and ability as a railway engineer, we presume there is but one opinion. Certainly we are quite willing to concede all that his warmest friends may claim in this regard, and are equally willing to believe that he has constructed the Canada Atlantic Railway in a thoroughly first-class manner as is stated. Yet after all, we incline to think a good portion of the success of the experiment must have been due to the locomotive that did the work. The description of this is meager and unsatisfactory. Full details of its construction would be of much interest to all builders and users of such machinery, the more especially that it is described as of somewhat peculiar construction.

Will not some of the parties possessed of the information let us have it through your columns.

E. H.

New York, May 24th, 1883.

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MR. JAMES J. WHITE, Ottawa, Canada, writer of "Our Canadian Letter," acts as agent for the AMERICAN RAILROAD JOURNAL in Canada. He is authorized to receive, in behalf of the company, subscriptions and advertisements for this journal; also news of the character which he can utilize in the preparation of his Letter, or send to us for use elsewhere within these columns. He respectfully invites information concerning Railroad matters generally, Mining, Banking, Finance and Manufactures.

We invite railroad officers to send us notice of elections, transfers, appointments, resignations, etc.; and all our readers would oblige us by furnishing us with any items of news which may come to their knowledge and are of a suitable nature for our columns. It is our intention to publish monthly full and accurate information regarding those enterprises and industries to which the AMERICAN RAILROAD JOURNAL is devoted, and to effect this end we solicit the co-operation of readers interested therein. We aim specially to record all new railway enterprises in the United States and Canada, and to note the progress of construction on all new roads and extensions; and we request those concerned in railway building to give us early information concerning the above, that our reports may be as complete as possible.

NEW YORK, JUNE, 1883.

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LEASE OF THE CENTRAL RAILROAD OF NEW JERSEY TO THE PHILADELPHIA AND READING RAILROAD COMPANY.

THE most important event in railroad circles of recent occurrence, is the restoration to the hands of the stockholders, from the hands of a Receiver, of the Central Railroad of New Jersey. This event has been hastened, perhaps a year or two, by the desire of the Philadelphia and Reading Railroad Company to secure the use of this line by a perpetual lease. The majority interest in the stock passed some time ago into the hands of parties owning and controlling the Philadelphia and Reading and the Baltimore and Ohio railroads. It is to be understood, however, that among the former is Mr. W. H. VANDERBILT, who has come to the help of Mr. F. B. GOWEN, president of the Philadelphia and Reading, in order to assist him to secure control; and without whose assistance there is reason to believe the road would have passed into other hands—the Pennsylvania Railroad Company. Mr. VANDERBILT, in investing in the stock of the Central Railroad Company of New Jersey, had objects of his own; first, to revenge himself upon the Delaware, Lackawanna and Western Railroad Company, which recently opened a competing line and took away its anthracite coal tonnage going to the upper lakes; and second, to hold in check the growing aggressiveness of the Pennsylvania Railroad Company, which is a competitor of its system, both at New York and at all points west of the Alleghany Mountains.

Mr. JOHN W. GARRETT's objects in investing in the stock of the Central Railroad Company of New Jersey are quite obvious. He desires to throw off his dependence upon the Pennsylvania Railroad Company for transit between Baltimore and New York City. The Baltimore and Ohio Railroad Company, of which he is president, aspires to become a trunk line to the three great seaboard cities, with ramifying connections to the five or six great cities in the Mississippi Valley. The Philadelphia and Reading and the Central of New Jersey together furnish the ninety mile link between New York and Philadelphia—by far the most costly and difficult portion of the whole, while the Philadelphia and Reading has a fork extending to Wilmington, which leaves less than sixty miles north of Baltimore to be constructed, to establish a through line. This can be done very rapidly, and by the expiration of another year we may look to see the through trains of the Baltimore and Ohio Railroad running continuously from Chicago and St. Louis to the banks of the Hudson River at Jersey City.

Mr. GOWEN's ambition and motive for investing in the stock of the Central Railroad Company of New Jersey is also two-fold: first, the long truce between the Philadelphia and Reading and the Pennsylvania railroads has been so strained that its usefulness has come to an end, and chronic war between these rival interests may be expected to take place. The Pennsylvania Railroad desires to penetrate the Schuylkill Valley, and tap the business heretofore exclusively enjoyed by the Philadelphia and Reading. On the other hand, the Philadelphia and Reading, so long halted at Harrisburg, aspires to build westward to Pittsburgh and the famous Connellsville coke region. At Pittsburgh it will be joined by the road recently completed from Pittsburgh to Lake Erie, owned in the Vanderbilt interest. It will be within

150 miles of the "Bloomington" and other independent roads through Ohio and Indiana. Second, since the lease of the North Pennsylvania Railroad and its Bound Brook extension, the through line between New York and Philadelphia has made an inroad upon the Pennsylvania's exclusive monopoly between the two great cities; and although traffic agreements have held up the rates, it would be very important to the Pennsylvania Railroad to secure control of the Bound Brook route also. This Mr. Gowen has prevented. The result will be parallel lines from New York to Philadelphia and Baltimore, as there are already between Baltimore and Washington, which is a serious blow at the Pennsylvania Railroad. That company has, however, the most complete and efficient organization in the United States, and hitherto has easily kept the lead in all those qualities which go to make up a perfect transportation system; and it is by no means destroyed, although somewhat injured by the present plans.

The peculiar significance of the Philadelphia and Reading's entrance to New York harbor lies in the fact that the Central of New Jersey has the most extensive and valuable water-front of any of the lines reaching New York—about 500 acres, fronting the lower part of the metropolis (most of it made land, filled in with the debris and sweepings of New York)—which furnishes the most convenient and accessible ground for warehouses, docks, wharves, and for tracks. There is no other spot of ground so available, fronting on deep water. It cannot be reproduced, and its money value can hardly be estimated. This is the great obstacle to building other and new Trunk lines from New York to the West. Access to the water front, where ship and car can be brought together, is and must be so expensive that for a long time to come it will be a serious obstacle to building; the New York, West Shore and Buffalo Railroad Company having secured wharves close under the Palisades, and the intermediate distance being covered by the Delaware, Lackawanna and Western, the New York, Lake Erie and Western, and the Pennsylvania Railroads. There remains only Staten Island and the Standard Oil Company's property at Bayonne available as terminal grounds for railroads.

The Central of New Jersey has, moreover, a good business of its own. It is, and has been for years, one of the largest coal carriers; its coal tonnage running up from three to five millions per annum, and the profits upon this can hardly be rated at less than one dollar per ton, average. This, of itself, makes it a desirable acquisition for the Philadelphia and Reading. It has also a very extensive local patronage by persons who do business in New York, and live in the string of suburbs along its line for the first thirty-five miles. It has, moreover, a Newark Branch which must be operated at a handsome profit. The Jersey seashore branch is fast becoming a remunerative investment, so much so that the Pennsylvania Railroad Company insisted upon a share of that patronage. Under the receivership of Judge LATHROP, an arrangement was entered into whereby the track from Woodbridge to Long Branch was to be used jointly, and the trains so arranged as to divide the business; the Pennsylvania Railroad Company managing to secure the greater part.

From present appearances, therefore, it would seem as if the Central of New Jersey would become the pipe end of the fun-

nel, through which trains will be passing southward to the Jersey shore, and to Philadelphia, Baltimore and Washington; Westward to the coal fields—to Harrisburg and Pittsburgh; and northward by way of the Lehigh Valley, to Lake Ontario and Buffalo. It is understood that the receiver is to retain in his hands a sufficient amount of securities held by the company, with an addition to be made over to him by the intending lessee, equal to about \$2,050,000 for the purpose of liquidating that amount of floating debt, as it may mature. The lease has been executed and ratified, and goes into effect at once. It is understood that its terms are a guarantee of six per cent. dividends upon the stock, payable quarterly from and after the 1st of September next. Speculators are asking what is the value of the guarantee of a company which has hard work to keep itself from the Receiver's hands. It is quite clear that for the first year, at least, the road will not earn the amount of this dividend; but inasmuch as the Philadelphia and Reading and its associates are to secure other collateral advantages by making the lease, it is not unreasonable that it should pay something for the control. At the same time, it is apparent that if the Central of New Jersey did not earn in the past year, 1882, with an enormous output of coal and good general business, enough to pay interest and fixed charges as they will stand in 1883 and 1884, it is difficult to see wherefrom it can do so with the declining activity before us. But in any event, the contemplated lease is quite as advantageous an arrangement as the lease by the Pennsylvania Railroad Company of the United Railroads of New Jersey for 999 years, which required that in order to control the ninety miles of road between New York and Philadelphia, the lessee should assume the debt on 400 miles of road and a canal beside, and then pay ten per cent dividends on the stock.

PASSENGER TARIFF.

WHEN we wrote the former article with the above caption, for the last number of the JOURNAL, we thought we had done with the subject. We wrote it in the regular order of subjects that come up for discussion in these pages, and did not expect to hear from it in any way or from any source. We naturally supposed that the readers of the JOURNAL would recognize the truths there set forth, and possibly that some roads might make an effort toward a reduction of fares for daily travelers. We had no idea, however, that we were so clearly voicing that which our readers were silently thinking.

But since the last number of the JOURNAL made its appearance, we have been approached by residents of Passaic, and have had numerous conversations with them on this subject, in the course of which we have received additional ideas, which may be of interest to the railroads and which we think, if carried into effect, will doubtless prove profitable to them.

It is a well-known fact that men doing business in New York City must either cross a ferry or go to Forty-second street, which is a long distance from the City Hall, to take a train. It is also a well-known fact that the Erie Railway has a large tract of territory to pass over, from its depot in Jersey City, before it can reach ground which is capable of being utilized for building sites. The time may come when the marshes between Jersey

City and Rutherford may be reclaimed and placed in a habitable condition, but that time is not yet.

Rutherford, being the first station of any note on the Erie Railway, bears the same relation to that road which a station three miles from the terminus of some other road bears to it. The residents are not to blame for the marshes any more than the railroad is, and the fact that the trains do not have to stop, except voluntarily, should be taken into consideration by the managers, and a passenger tariff made which would prove satisfactory to all concerned.

Now there is no question whatever, in the minds of intelligent men, but what the single fare of forty cents from New York to Passaic is altogether too high, and rather prevents parties searching for homes in that vicinity from locating there. The same may be urged against the fare of thirty cents to Rutherford and of fifty cents to Paterson. It will be claimed, however, by the road that parties can buy an excursion ticket to Rutherford for forty cents, to Passaic for fifty-five cents, and to Paterson for seventy cents, which enables the seeker for a home to go and return for nearly the same as a local fare. But, when it is taken into consideration that a man does not select a home on his first trip, but generally makes several trips before deciding, it naturally follows that, as his car fares multiply, he becomes discouraged and abandons that locality for one which he can reach for less money.

One of the prime factors in the success of a railroad is its local travel. To procure local travel, it is necessary that on the line of every railway there shall be thriving villages, towns and cities. It behooves the managers of railways, then, to do all that is possible to make these places thriving, not alone by building tasty depots and keeping the grounds around them in good condition, but by making a passenger tariff that will invite travel instead of restricting it.

Take the trunk lines: On the long distances, they recognize the fact that, if they are to have passengers, they must place their rates within the reach of the would-be passengers' purses, or else some other road will underbid them and secure the bulk of the travel. This holds true, except during those periods when the roads form a pool and all charge the same prices for their tickets; even then some one road, sharper than the others, will have scalpers to sell tickets, over their lines, at cut rates.

Another thing is noticeable; on through trains the different roads are particular to have the best car accommodations, and the finest rolling-stock, while, apparently, anything is good enough for the local trains; and some of the cars running over the Erie Railway to Paterson would prove a disgrace to anything which pretended to be better than a coal train.

Now that the bridge is finished to Brooklyn and the elevated roads have made Harlem and Morrisania accessible, and the New York City and Northern road can carry passengers from South Ferry to South Yonkers in fifty-five minutes, and the prospect is good for an underground road under Broadway—the question becomes interesting—what is to be the value of New Jersey property within twelve miles of Jersey City, and what are to be the earnings of the roads running out of Jersey City, unless some action is taken on the part of the railway managers to cater to the public wants?

A passenger can leave South Ferry during commission hours and ride to one hundred and fifty-fifth street for five cents, and the railways running from Jersey City, having the disadvantage of a ferry between Jersey City and New York, ought to be able to carry passengers the same distance for the same money. The argument may be brought up by the railroads that they do not have the number of passengers carried by the elevated roads and, therefore, cannot be expected to carry them as cheaply, which argument is, to a certain extent true, but can be set aside by considering the number of times a single passenger would ride if the fare were reasonable.

An esteemed correspondent writes, "I take the ground that all surface railroads can better afford to carry passengers the same distance for ten cents per trip than the elevated roads can. In the first place the surface roads did not cost as much to build (as represented by the bonds and stocks), therefore they do not have to earn as much money to pay interest on bonds and dividend on stock. In the second place, the elevated roads are required to run from 5:30 to 8:30 A. M. and from 4:30 to 7:30 P. M. at five cents a trip, and it is safe to say that the bulk of the travel avail themselves of these hours. 3d. The elevated roads carry no express or freight, which prove very profitable to the surface roads. If the surface roads say they cannot make money at reduced fares, let them satisfy the public by trying it one year, and then give the result in a sworn statement."

If the Erie Railway would sell ten tickets for a dollar to Rutherford, West Rutherford, Passaic Bridge, Prospect St., Passaic, Harrison St., Clifton, Lake View and Paterson on their main line, and for the stations between Jersey City and Paterson on their Newark Branch, the residents of these different places would travel over the road a great deal oftener than they do, and it seems to this Journal that the road would make a great deal more money than at the present tariff.

As the tariff stands to-day, a resident of Passaic buys his commutation ticket and rides in and out once a day. For the sake of saving fifty-five cents, the price of an excursion ticket, or the necessity of buying a mileage ticket and the payment of twenty dollars at one time, he will try to do his wife's shopping and procure articles wanted by his family, instead of his wife or the members of his family doing it for themselves. On the other hand, if ten tickets could be bought for a dollar, he would not hesitate to lay in one, five or ten dollars' worth of tickets at a purchase, which would be put into the family box, and any time the family needed anything, any member of it would not hesitate to go to New York, instead of burdening the head of the family.

It is time for railways to recognize the rights of passengers in order to promote their own welfare and prosperity, and this can be done—not by the manipulation of its securities on the Stock Exchange—but by meeting the necessities of the case, in the transportation of passengers and the carrying of freight.

Our roads have been more damaged than helped by the Stock Exchange, because while a few sharp men have been enabled to grow wealthy, the roads have not grown prosperous, because the efforts put on the Stock Exchange to manipulate the stock have not been put into the management of the road and the running of its daily trains. It seems to us as if the time had come when

that road which first recognizes the rights of passengers will be the most successful in building up villages and towns on its line and thus increasing its passenger travel and the quantity of freight it will carry. There is no reason why the present system of commutation tickets should not be abolished. No railroad has any right to make its passengers police officers, watching the conductor and the ticket agent. No business man thinks of making the purchaser of his goods a guardian to keep the employés of the seller honest, and so no railway management ought to take the thousands of passengers traveling over the road, and place them in the position where they stand between the company and its officers to prevent the stealing of fares. A season ticket should be issued to the passenger for a specified time, good for any number of rides that he may choose to take.

Now, these thoughts and the thoughts expressed in the former article can be summed up as follows:—First—The railroads running out of Jersey City must see to it that their rolling-stock on local trains is as good and comfortable as the rolling-stock of through trains. Second: They must be as careful to run their local trains on schedule time as they are to run their through trains. Third: Their passenger tariff must be just as favorable for local traffic as it is for through traffic. Fourth: Instead of issuing commutation tickets for a certain number of rides, to be taken in a certain specified time, they must issue season tickets, good for any number of rides in the specified time. Fifth: In order to build up the villages and towns along the line of their road, they must offer some inducements in the shape of free transportation for a certain specified time, according to the value of the house erected.

The road adopting the above measures and broadly proclaiming them, will be the road along whose line parties will choose to settle, and such road will be prosperous—not from any manipulation by its managers on the Stock Exchange, but from a healthy, legitimate growth, which will not be subject to the fluctuations indicated by the ticker. Passengers are the most profitable freight the road carries because they load and unload themselves.

THE CHICAGO EXPOSITION.

THESE remarks are written when the flow of visitors to the National Exposition of Railway Appliances is approaching its height. Glorious summer weather invites to travel, and the normal self-complacence and importance of the commercial center of Illinois are being gratified to an extent which taxes severely the far-famed eloquence of its chroniclers. The choice of Chicago as the scene of an unprecedented exhibit of railway appliances is unquestionably a wise one. No city in the Union offers equal facilities for this purpose, and the event in progress is the most pleasingly important in its eventful history thus far.

It is noteworthy that the opening of the Exposition was contemporary with that of the bridge spanning the waterway between New York and Brooklyn. While this structure represents the best results of modern engineering, the exhibition presents a history of railroad development, which in its progress has given that experience in bridge-making which has made the Brooklyn Bridge a leading fact in the story of the conflict between the ingenuity of man and the difficulties presented by Nature.

The generalities of the press evolved by the Exposition, seem to pretty well cover the ground, but it, perhaps, remains to be said that the invention of the locomotive is the greatest event in the industrial history of the world. That quaint old engine, "No. 1," sent to Chicago from England, and the observed of all observers there, was the pioneer of the most comprehensive and potent change in human affairs as yet given old Father Time to set down in his teeming records.

The electrical train, running constantly its round of duty on the Exposition premises, is an embodied prophecy. It dates more than half a century ahead of "No. 1." The hoary visitor to an exposition of railway appliances in the year 1930, will, it is to be hoped, be enabled to compare the present stage of industrial development with that of his own age, among other ways by witnessing its operations. Many, we trust, who see these now, will be present to make the comparison, and of them a large proportion of hoary-headed persons who will refer with the proud garrulity of old age to the visit they made to Chicago in the year of grace 1883, and when they were in the employment of a railroad company.

THE Young Men's Christian Association, of Springfield, Mass., sets an example worthy to be followed by other organizations of the kind, in its operating a railroad branch institution, which is well supplied with daily, weekly and monthly publications, and has an amusement room, wash-room, hall for social gatherings, and supplies of stationery for members, religious services, entertainments, concerts, lectures, etc. A good library, now in process of collection, is among the other attractions offered by this useful institution. The work of the branch is sustained by the Boston and Albany Railroad, New York, New Haven and Hartford Railroad, Connecticut River Railroad, Wason Manufacturing Company, many citizens of Springfield and by the sustaining members. Any railroad man, by the payment of twenty-five cents per month, becomes a sustaining member, and every railroad man is cordially invited to join and share in the full benefits of the Association, and aid in its support. In these times, when such crotchety persons as condemn an organization without reserve, because, forsooth, they fail to find some feature about it upon which they set great store, or for some other equally inadequate reason, are wasting words in attacks on Young Men's Christian Associations and similar bodies, it is well to state the good things being done by the Railroad Branch of the Young Men's Christian Association of Springfield, Mass., as a sample of what thousands of similar organizations are doing. The croaker should find matter in the recital to abash and silence him.

We hope and believe that the remarks on color blindness in railway employés, printed elsewhere in this issue, will be read and considered with the thoroughness due to the importance of the subject upon which they treat. Their author is no mere crotchety-monger, and his views should command the greatest attention from the companies which, in these days of travel, have the safety and lives of their fellow-citizens very much in their keeping. As we said before, we have no fear but that Dr. JEFFRIES will be fairly treated by his readers. The operators of

railroads are naturally more concerned than any other class, out of regard for their own interest as well as for other reasons, to provide in any way practicable for the safety of their passengers. If, as our learned writer seems to think, the tests as now used are not adequate to the detection of color-blindness and otherwise defective vision in railroad employes and candidates for employment, the interest of railroad companies lies in a proper and more thorough application of them by perfectly competent persons.

A TERTIO-Millennial Anniversary Celebration and Grand Mining and Industrial Exposition are announced to take place at Santa Fé, New Mexico, opening July 2, and closing August 3, next. A programme of formidable length accompanies the announcement. Speechifying, music, Indian games, Mexican games, horse-racing, balls, Indian war-dances, the presentation of historic scenes and histrionic entertainments are some features of the prolonged festival. The exposition of mining, manufacturing and other industries will occupy a main building 480 x 60 feet, with annexes. We hope "the affair" will prove a success. The novelty of a "tertio-millennial" jubilation and its being on a scale, especially of duration, worthy of its imposing denomination, recommend it to the attention of people at a distance as well as near the scene of the celebration, the meaning of which is that Santa Fé will be 333 years old at the time of its being held.

GREAT interest has been excited by the publication in these columns of Dr. HERRICK's papers on railway medical service. Their continuation will doubtless maintain the wholesome interchange of views on the important subject treated, which has succeeded the publication of articles from his able pen. As heretofore we place the space devoted to correspondence at the service of gentlemen who have something to say for or against or additional to the Doctor's remarks. Correspondents will kindly be as brief as they can in what they have to say. In this way variety and force, and consequent pleasure and gain to the reader, will be insured.

THAT street-below-a-street project known as the Broadway Arcade, of which we gave an account in our last issue, is more fully described in this. We refer the reader to the best and longest article on the subject yet published.

A FULL and comprehensive account of the Chicago Exposition of Railway Appliances will be published in our July issue, when this can be properly done as a review of a past event.

THE Souvenir for the spring of 1883 published by the Iron Publishing Company, Philadelphia, is No. 19 of Vol. XIX of *Iron*, a journal, like its subject, substantial and formed for durability. Whether or not the reader of *Iron* agrees with its views on protection, he cannot but be gratified at the array of industrial facts presented in its neat, business-like pages. We congratulate our useful contemporary on the evidences of prosperity which appear so strikingly in the "Souvenir," which, by the way, is radiant in a wrapper of beautiful and apt design, printed in colors.

SUBSCRIBE for the AMERICAN RAILROAD JOURNAL.

RAILROAD MEDICAL SERVICE.

(CONTINUED.)

BY S. S. HERRICK, M. D.

SECRETARY BOARD OF HEALTH, STATE OF LOUISIANA.

THE GERMAN EMPIRE.

HAVING made application to the Chancellor of the German Empire for specific information relative to the medical service existing upon its railways, I have been furnished with manuscript and printed documents bearing upon the subject, which form the basis of the present article. The regulations in force have neither been established by law nor by railroad officials, but "originated with the minister"; by which we may understand that an important government officer is clothed with extensive discretionary powers over the management of railways under a government eminently paternal, and quite appropriate to a country regarded by its people as their "fatherland."

Medical men are engaged for special districts by the railroad administration, under contract, of which a specimen copy has been furnished. This defines the precise boundaries of his district, and obligates him to render medical, surgical and obstetrical aid to railroad employes and their families, servants excepted. Laborers temporarily employed are also entitled to his services, when sick or injured within his territory, in case their removal to hospital be not actually necessary. The doctor is to be prompt in attending calls, and may be required to attend persons not belonging to his district, who are passing through it. He is to make monthly and annual reports to the Government Health Department, according to blank forms supplied. He promises to furnish all certificates concerning persons treated by him, which may be required by the management in the interest of the company. He is to designate an alternate physician, who will supply his place when sick or absent, and at his own expense. In addition to a certain stipulated compensation, the doctor has a free pass, in a second-class railway carriage, and is entitled to reimbursement for cost of private conveyance to a railroad patient off the line of road, when the distance is more than two kilometres. The contract runs for one year. Notice must be given beforehand, if the doctor desires to cancel it before expiration. The company reserves the right to cancel it summarily, for good cause.

All those in the service of the State railways are entitled to medical attendance and medicines, except bureau officials and those of high grade and salary. This privilege applies to every illness or injury without exception, and is enjoyed likewise by members of the family, but not by domestic servants.

In most cases the expense of this service is borne exclusively by the company; but in some it is defrayed from a relief fund, to which employes contribute.

Large cases of instruments and such surgical appliances as are needed for the treatment of injuries are kept at stations, whence they can be forwarded to the scene of an accident. Smaller outfits are carried on trains, for the use of the train attendants, previous to the arrival of the doctor.

Printed instructions are furnished to station-agents and train-conductors, for the general management of injured persons in the absence of a surgeon. These they are required to familiarize themselves with, and also with the application of bandages and simple dressings. Before me is a little pamphlet issued by the Bureau of Railroad Direction at Berlin, first in 1877 and again in 1881. It contains instructions for the immediate relief of persons injured by railroad accidents, or suddenly falling sick, before the arrival of the doctor.

The following is a brief synopsis of its contents. The larger cases of instruments are for the use of the surgeons only. The smaller ones are in charge of train-conductors or baggage-masters, or oldest brakemen as alternates. Not only must the station-

agent be familiar with the printed instructions, but he must see that some other attendant also is instructed, so as to act in case he is absent or disabled. These officials are to take charge of sick or injured persons until the arrival of the physician, and are required to exhibit such activity and presence of mind as to meet the exigency and prevent panic. They must receive instructions from the medical officers in the duties expected of them, and practice the application of simple dressings. Plain directions are given for the management of cases of fainting, unconsciousness and apparent death; for the arrest of hemorrhage; for the dressing of wounds; for the relief of coughing and vomiting of blood; for the treatment of blisters and excoriations, of sprains and dislocations; for the treatment of simple fractures, particularly of the arm and leg; also of compound fractures, involving the crushing or laceration of soft parts; for the treatment of burns; what to do on the return of consciousness to those injured; and lastly what must not be done. The pamphlet closes with catalogues of the contents of the larger and the smaller surgical cases.

No special railroad hospitals have been erected, for obvious reasons. The whole country is densely populated, and it is found more convenient and less expensive to make use of the general hospitals already established.

Provision is made by the different companies for the care of those permanently disabled through sickness or injury while in the discharge of duty. In case of death, provision is made for their families. Certain classes of employes are also entitled to retire upon a pension after service for a period not less than ten years. Their widows are also entitled to a pension, and their young children to an allowance for their rearing. There are besides benevolent associations among railroad employes, sustained by voluntary contributions, which afford relief to the sick and injured and aid to their widows.

Normal sight and hearing are positively required of those who fill certain positions, such as engineers, signal-men and conductors. Candidates for these positions are examined by railroad physicians, with special reference to color-blindness. After suffering typhoid fever, injuries to the head or severe shocks of any kind, the examination is renewed; and at regular periods of five years the examination is repeated. Dr. B. Joy Jeffries has shown that the examinations for color-blindness in Germany were very imperfectly made in 1877, the percentage of those found defective being generally much less than one per cent. Colored glasses, papers and lanterns were used, instead of the colored worsteds recommended by Prof Holmgren. Dr. Jeffries, however, believes that the examinations are now conducted more efficiently, by official order, but on this point I am not positively informed.

Inasmuch as the German railroad companies are obligated to provide for their employes in sickness and for their families after death, it would be very remarkable if their physical examination were confined to the senses of sight and hearing. It would appear that common prudence must dictate precautions for preventing those who labor under any defect of vital organs from becoming a charge upon the company, and likewise those who become disabled through their own vices. It has already been stated in these pages that employes on the railroads of Saxony are subjected to a searching physical examination, and I can not suppose that it would be limited to tests of sight and hearing in any part of the empire.

The extent of corporate liability is shown by a printed copy of a law promulgated in 1871 over the signatures of the Emperor William and of Bismarck, of which the following is a synopsis: Railroad companies are responsible for the death or bodily injury of individuals in their service, unless it can be shown that the same resulted from some providential dispensation or the direct fault of the sufferer. Compensation is decreed as follows: In case of death, the cost of medical attendance and burial. In case of total or partial disability for work, the allowance is to be proportionate; and his family, if he have any, have a correspond-

ing claim for relief. In case of injury, indemnity shall cover the expense of surgical attendance and also loss of pay involved by inability to work. Whenever the sufferer is insured against accidents, and the company contributes a portion of the premium, this contribution shall be taken into account in settlement, unless it be less than one-third of the whole amount of premium paid. The company can not evade responsibility by any previous agreement with employes disclaiming such responsibility. All agreements contrary to the spirit of this are null and void. When both parties can not agree upon the amount of indemnity the Court will decide upon the extent of the injury and the disability, and will in general grant a fixed allowance. Under change of circumstances, the company can apply for stoppage or reduction of the allowance; or, on the other hand, the sufferer, within the prescribed period (hereafter named), may claim an increased allowance. In case the solvency of the responsible party be questionable, security for the fulfillment of the obligation may be demanded. The period of compensation is fixed at two years, beginning with the date of the accident, for the individual injured; and the same period for his family, counting from the day of his death. This law is not intended to supersede other laws which define corporate responsibility, as applied to different cases, and especially where the whole fault rests with the sufferer.

There are government regulations in force to prevent the infection of railroad cars by diseased animals, and to enforce cleanliness of the cars. The following is a synopsis of the imperial edict of 1876, relative to the disinfection of railroad cars used for transporting live stock: Cars used for carrying horses, mules, cattle, sheep, goats or hogs, must be thoroughly disinfected as soon as emptied. Also the pens, landing places, etc., whenever used, may be required to undergo disinfection. The duty of disinfecting cars falls upon the company within whose territory the same may be unloaded. Cars returning from a foreign country must be disinfected by the first company which receives them at the frontier. The "Bundesrath" is empowered to make exceptions to this last rule, upon suitable guarantee for their disinfection before return. The "Bundesrath" may also dispense with disinfection of stock-cars, used in inland traffic only, in localities which have been exempt for three months from pleuropneumonia and the foot-and-mouth disease of domestic animals. The penalty for neglect to carry out the above regulations, by those officials specially held responsible for the performance of the duty, is a fine not exceeding 1,000 marks (\$250); and, in case a contagious disease is thereby propagated among animals, the penalty is a fine of 3,000 marks or imprisonment for one year.

The "Bundesrath" has formulated rules for the cleansing and disinfection of cars, as often as they may be used for transporting live stock. These rules are quite specific and need not here be given in detail. The cleansing is in no case to be omitted after discharge of the car, though some discretion may be used in regard to disinfection. This last is to be effected (a) by means of steam of not less than 100° Cent. (212° F.); (b) by a solution of caustic soda or potash (1 part to 500) in water heated to 70° C.; or (c) by a hose throwing a solution of chloride of lime or other approved disinfectant. In case the cars are known or strongly suspected to be infected, still more energetic measures are to be used, under the police regulations of the locality. Similar rules apply to the pens and places used for receiving and loading cattle. Those who supervise the work of cleansing and disinfection for the railroad companies, must conform to the veterinary-police regulations which apply to such matters.

It is apparent from the above that the paternal government compels the observance of sanitary precautions in the interest of the public health; while in this free and happy country property interests are supposed to be an adequate motive for using the same or similar measures. It is safe to say, however, that the usual American plan, apart from sanitary authority, as regards disinfection, is to trust to luck and let chemicals alone. A well-organized medical department would provide and execute all needed regulations of this kind, without legislative interference.

[TO BE CONTINUED.]

Color-Blindness in Railway Employees.

BY DR. B. JOY JEFFRIES.

THE subjoined remarks are selected from an article written by Dr. B. Joy Jeffries, and published in *Gaillard's Medical Journal*. "I think I have convinced the community, including recalcitrant railroad people, of the prevalence of color-blindness. The practical railroad man, however, who would not let a doctor build his bridge, or a civil engineer operate on his eye for cataract, cannot understand the danger from color-blindness. Defective vision when excessive, as from near-sightedness, he may appreciate. He cannot get rid of the idea that his color-blind engineer or fireman does use his color sense to distinguish the night signals. An official in Connecticut told me one of his engineers 'could not tell any color,' and yet he distinguished the colored signals. He would listen to no explanation of mine as to how he did this, and was only silenced by my asking by what sense did the employé distinguish the signals if he had no color perception.

"Railroad officials and commissioners are now forced to admit the existence of color-blindness and its frequency. They are not yet ready, however, to admit its danger, just as they are not ready to admit that employés should have average visual power to be safe in railroad work connected with signal giving and reading. With reference to this last it is useless to argue. The time is not far distant when the community will demand expert proof of every employé's having normal eyesight, and this will be found to be, to every one's surprise, a much higher standard than demanded by any laws now made or proposed in reference to railroad employés or sailors.

"All railroad people are naturally wholly antagonistic to any law compelling them to act as they have not hitherto done. They are, so to speak, eminently practical men, wholly wedded to the theory that a man who, to their test, seems to see colored signals nearly always right, cannot be dangerous, and they, even when admitting danger, will insist on practical tests with flags and lanterns under conditions favorable to the examined. Such tests were long ago found to be useless and unfair to the employé, as well as almost impossible to be carried out so as to exclude the possibility of cheating on his part or that of his friends. The loss of time of the employé, and the great cost of testing, would prevent this method, were it not wholly worthless to determine whether a color-blind sees colors as we do. It has been absolutely proved, and even quite generally admitted, that the color-blind distinguish between the red and green lights by their intensity solely, or by extraneous circumstances having nothing to do with the question of the color of the lights.

"I have never found even the most skeptical otherwise than thoroughly convinced of any degree of color-blindness being dangerous on the railroads and the sea, when they would take the time and the pains to watch examinations made with the various apparatus devised for this purpose, and which so perfectly imitates the conditions of the signals, but leaves out the extraneous conditions that help the color-blind, which extraneous conditions can never be relied on.

"The absurdity of railroad officials and steamboat inspectors testing for color-blindness by flags and lanterns is shown by this—namely, that if they use the bluish-green lights employed both on many roads and sold as often as the green for ship's side-lights, the employé or the pilot can, even if color-blind, see it very much as we do, only somewhat darker. When this light is shown him on the road, he will, of course, say green, because other people call it so. Any different light he will call red, because he knows that is the name of the other one shown, which he does not, of course, see is red, but only different from the other. The green in the glass makes it darker to him, but the blue he sees, since all red or green blind people (one defect practically involving the other) see blue and yellow as we do. Those un-

familiar with the fact would be surprised to see how utterly different are the two lights sold in the shops and used to go on the same (the starboard) side of the vessels. Now this dark bluish-green glass breaks down the amount of light very greatly, and prevents its being seen even by the normal-eyed at a distance it must be to insure safety. Thus the color-blind will escape detection by such officials, and these latter will, as they have, become strengthened in their belief of the infrequency of the defect and its harmlessness.

"If medical experts agreed to do all the work necessary, without compensation, it would not advance the cause of control of defective vision. Let, however, the stockholders be mulcted by heavy damages, and dividends passed, from an accident caused thereby, and the law would be clamored for. Recalcitrant railroad officials would be dropped at the next annual election, against which they naturally would fight as strongly as the color-blind employé. A broken arm or leg will cost any railroad company more than the whole expense of a most thorough examination of all the employés of the road. An accident from defective sight would give these officials now anxious, but unable, to do their duty, the necessary backing up of the general sentiment of the community."

Dr. Jeffries has placed in the Chicago Railway Exposition his "Manual on Color-blindness, its Dangers and its Detection," together with the apparatus described in the book for detecting this curious defect and accurately measuring its amount. The American Master Mechanic Association have also invited him to speak before them during their meeting in Chicago, on defective vision among railroad employés. This invitation he has accepted, and on June 20th, opportunity will be given to all interested, to hear a thoroughly practical exposition of color-blindness and defective sight, and explanation and exhibition of the apparatus used in their detection.

A New Trunk Line.

ANOTHER railroad, that of the New York, West Shore and Buffalo, has been added to the list of great lines centering in New York City, or having it for their headquarters. This road has had peculiar advantage in being constructed at this period in the history of railroad building. One may justly say that almost positive perfection has been reached in constructing road beds; in the manufacture of steel rails, locomotive engines, cars and general equipments. The new, forty years ago, that such a road as the New York, West Shore and Buffalo was completed and with cars running as far as Newburgh, would have excited public interest in Europe and America. Now, it is but one of the great cable strands supporting the structure of our wonderful American railroad system. The remaining portion of the line of the road will be finished early this fall.

The completion of this new double-track, steel-rail Trunk Line, extending along the West Shore of the world-famed Hudson, and through the Valley of the Mohawk, connecting the important cities of New York, Newburgh, Kingston, Albany, Schenectady, Utica, Syracuse, Rochester and Buffalo, besides furnishing another independent highway between the Great Lakes and the principal Atlantic seaports, will be a memorable event of national importance.

Sojourners among the Catskills, or transient visitors to that delightful mountain region, have a personal interest in the provisions already made for their special accommodation and comfort. At Kingston, Union Depot facilities will enable trains to make direct connection with trains of the Ulster and Delaware Railroad, thus obviating the transfer of passengers or baggage. At Catskill, connections will be made with the Catskill Mountain Railroad, in order to accommodate the great number seeking an entrance to the Mountains through that gateway. A speedy trip on an elegantly equipped train, over a superbly built double track, steel rail line, in the cool shadows of the Highlands, around the foot-hills of the Catskills, and traversing all the historic and picturesque points along the west shore of the Hudson, will mark a new era in experience of pleasure travel.

RAILROAD EARNINGS—MONTHLY.

B. C. R. P. & N.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1881.....	167,750	124,510	148,551	184,680	165,630	205,912	174,351	209,112	221,748	221,748	202,180	232,812	2,259,037
1882.....	252,823	225,621	224,107	178,304	199,278	211,257	198,176	224,921	261,439	261,439	278,130	246,062	2,800,679
1883.....	197,402	167,001	252,913	218,253	208,671	.....	.....	.....	.....	.....	.....	.....	.....
CENTRAL PACIFIC:													
1881.....	1,602,907	1,454,218	1,709,638	1,872,370	2,091,411	2,159,382	1,899,346	2,088,519	2,185,303	2,507,857	2,297,971	2,225,179	24,094,101
1882.....	1,839,469	1,720,675	1,969,737	2,054,687	2,342,298	2,229,105	2,076,648	2,350,557	2,495,445	2,424,529	2,139,239	2,020,349	25,662,757
1883.....	1,718,000	1,424,000	2,021,000	2,035,000	2,099,000	.....	.....	.....	.....	.....	.....	.....	.....
CHESEAPEAKE AND OHIO:													
1881.....	162,540	184,389	228,479	227,343	252,235	241,135	225,096	262,858	247,144	236,306	230,022	203,562	2,702,762
1882.....	208,746	179,053	215,445	207,454	257,040	260,753	306,831	371,175	332,219	347,882	287,850	.....	.....
1883.....	244,142	250,287	270,676	279,659	337,922	.....	.....	.....	.....	.....	.....	.....	.....
CHICAGO AND ALTON:													
1881.....	487,890	461,641	529,915	558,190	548,556	635,860	676,205	769,751	774,790	771,844	672,380	646,812	7,557,741
1882.....	585,830	517,897	588,700	564,861	559,577	617,250	702,635	856,398	912,692	858,674	749,915	701,066	8,215,495
1883.....	637,804	538,537	671,576	584,981	630,097	.....	.....	.....	.....	.....	.....	.....	.....
CHICAGO AND NORTHWESTERN:													
1881.....	1,240,664	963,204	1,178,795	1,474,612	1,879,006	2,306,440	1,983,032	2,315,164	2,292,676	2,341,098	2,019,038	1,855,477	21,849,209
1882.....	1,644,935	1,474,176	1,672,931	1,668,741	2,110,947	2,022,700	2,025,736	2,099,755	2,497,053	2,532,100	2,069,287	1,718,379	22,550,804
1883.....	1,382,704	1,204,907	2,059,700	1,742,900	2,122,698	.....	.....	.....	.....	.....	.....	.....	.....
CHICAGO, BURLINGTON AND QUINCY:													
1881.....	1,307,948	1,034,821	1,418,149	1,574,371	1,679,455	2,083,803	1,888,358	2,173,945	2,262,981	2,031,001	1,816,133	1,905,490	21,176,455
1882.....	1,638,834	1,457,300	1,566,217	1,530,838	1,505,461	1,437,164	1,625,006	2,086,858	2,186,400	2,270,444	2,199,421	2,027,000	22,550,804
1883.....	1,625,680	1,611,021	2,396,583	1,824,130	.....	.....	.....	.....	.....	.....	.....	.....	.....
CHICAGO, MILWAUKEE AND ST. PAUL:													
1881.....	990,847	682,717	916,989	1,259,946	1,538,491	1,729,811	1,568,706	1,678,361	1,644,670	1,591,052	1,569,597	1,854,269	17,022,462
1882.....	1,434,536	1,376,376	1,561,386	1,517,567	1,627,931	1,620,000	1,465,000	1,545,000	1,950,000	2,251,000	2,072,000	1,964,000	20,386,726
1883.....	1,359,000	1,258,000	2,044,000	1,972,000	2,034,000	.....	.....	.....	.....	.....	.....	.....	.....
CHICAGO, ST. PAUL, MINNEAPOLIS AND OMAHA:													
1881.....	257,786	158,594	251,648	261,211	350,124	404,562	383,202	385,586	373,370	379,099	592,921	432,615	3,981,296
1882.....	377,498	333,200	413,200	377,288	402,882	363,109	331,480	394,555	482,997	546,671	317,595	375,790	4,973,052
1883.....	302,700	277,900	415,800	419,535	446,746	.....	.....	.....	.....	.....	.....	.....	.....
DENVER AND RIO GRANDE:													
1881.....	307,476	317,681	398,493	433,111	514,767	584,230	548,284	606,193	589,287	638,432	547,055	626,728	5,980,488
1882.....	488,599	407,000	521,500	556,917	606,400	537,462	495,797	574,040	595,306	630,598	512,905	443,000	6,349,857
1883.....	418,300	433,400	521,000	573,700	631,900	.....	.....	.....	.....	.....	.....	.....	.....
HANDBAL AND ST. JOSEPH:													
1881.....	154,401	122,874	176,356	190,812	172,950	190,740	201,899	210,240	215,103	231,913	195,607	194,336	2,230,961
1882.....	125,001	152,601	185,368	158,113	165,630	147,526	184,609	254,569	239,732	238,563	249,252	239,891	2,303,388
1883.....	179,591	180,887	228,170	193,481	194,394	.....	.....	.....	.....	.....	.....	.....	.....
ILLINOIS CENTRAL:													
1881.....	631,281	524,499	557,789	662,493	673,259	803,887	720,004	868,407	828,847	815,238	737,218	763,475	8,586,397
1882.....	1,019,453	987,998	995,474	887,543	891,328	663,746	752,251	813,600	828,238	865,325	752,144	697,051	8,831,281
1883.....	1,058,620	931,971	1,106,058	888,431	947,216	.....	.....	.....	.....	.....	.....	.....	.....
INDIANA, BLOOMINGTON AND WESTERN:													
1881.....	90,283	83,261	192,085	203,677	200,064	199,846	199,125	272,114	247,332	225,678	200,450	192,622	2,487,569
1882.....	195,824	175,755	204,538	205,934	182,554	186,133	206,072	278,814	273,100	269,046	256,998	205,212	2,641,675
1883.....	248,142	202,931	268,801	215,912	234,151	.....	.....	.....	.....	.....	.....	.....	.....
LOUISVILLE AND NASHVILLE:													
1881.....	812,118	805,124	947,959	855,704	828,726	1,227,885	817,135	876,192	951,566	1,002,950	1,065,223	1,153,779	11,344,361
1882.....	964,527	960,315	1,068,834	953,603	958,130	1,215,490	1,063,765	1,043,912	1,114,513	1,215,932	1,192,390	1,221,509	12,981,432
1883.....	1,118,735	1,015,000	1,141,337	941,129	1,050,615	.....	.....	.....	.....	.....	.....	.....	.....
MOBILE AND OHIO:													
1881.....	224,347	216,768	230,916	163,551	145,803	136,517	135,546	160,789	210,262	256,924	262,986	258,812	2,403,324
1882.....	159,676	158,590	148,166	141,957	134,378	136,184	135,174	137,475	157,874	267,433	295,110	307,643	2,179,666
1883.....	216,608	172,200	180,113	128,162	143,294	.....	.....	.....	.....	.....	.....	.....	.....
NASHVILLE, CHATTANOOGA AND ST. LOUIS:													
1881.....	178,143	190,866	207,710	183,525	104,430	154,549	150,430	168,317	179,979	172,121	152,059	173,127	2,075,258
1882.....	170,753	174,974	177,336	167,393	135,556	119,074	160,991	168,304	168,999	180,319	181,336	186,352	1,933,047
1883.....	197,388	195,262	206,164	161,435	.....	.....	.....	.....	.....	.....	.....	.....	.....
NEW YORK AND NEW ENGLAND:													
1881.....	189,749	173,614	212,019	216,913	217,185	231,518	246,821	280,524	299,573	261,200	240,764	240,063	2,809,255
1882.....	213,840	217,261	265,222	261,044	289,722	295,392	298,441	346,490	338,347	310,145	276,183	261,082	3,408,169
1883.....	258,266	231,741	284,869	268,853	290,951	.....	.....	.....	.....	.....	.....	.....	.....
NEW YORK, LAKE ERIE AND WESTERN:													
1881.....	1,296,381	1,252,218	1,644,958	1,643,151	1,592,544	1,661,812	1,580,976	1,606,874	1,786,417	1,899,010	1,799,338	1,726,788	19,149,361
1882.....	1,443,437	1,425,765	1,847,201	1,709,057	1,776,891	1,794,982	1,787,081	1,772,895	1,734,200	1,814,866	1,715,469	1,571,208	20,393,112
1883.....	1,318,997	1,304,757	1,567,632	.....	.....	.....	.....	.....	.....	1,819,010	1,818,824	1,691,404	20,203,469
NORTHERN CENTRAL:													
1881.....	386,157	382,657	452,906	487,273	465,588	487,287	440,811	498,008	429,565	449,664	487,160	476,622	5,443,697
1882.....	407,368	413,551	414,789	420,490	482,607	482,752	509,683	667,488	592,435	550,225	526,685	490,003	5,600,176
1883.....	499,252	486,865	506,864	476,335	.....	.....	.....	.....	.....	.....	.....	.....	.....
NORTHERN PACIFIC:													
1881.....	116,508	78,803	162,984	216,210	312,705	412,024	393,260	434,085	534,363	583,955	475,610	439,724	4,044,576
1882.....	245,369	269,935	373,141	451,023	616,231	704,617	694,067	727,215	772,838	829,831	761,324	504,749	7,009,344
1883.....	392,035	373,091	383,400	675,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
PHILADELPHIA AND ERIE:													
1881.....	224,303	225,501	285,573	293,333	343,792	350,585	291,669	303,849	276,522	292,392	284,078	282,772	3,454,309
1882.....	252,727	245,246	265,311	277,851	341,415	347,614	377,206	20,3294	386,455	397,164	369,583	335,513	4,011,413
1883.....	319,720	295,638	308,069	311,636	.....	.....	.....	.....	.....	.....	.....	.....	.....
ST. LOUIS AND SAN FRANCISCO:													
1881.....	212,435	178,234	262,050	265,298	283,399	260,254	252,333	286,373	279,064	308,569	284,320	287,914	3,160,245
1882.....	256,784	244,654	274,959	242,806	253,419	240,177	318,613	381,637	336,805	360,900	331,490	339,424	3,582,811
1883.....	278,321	236,278	351,689	274,011	296,756	.....	.....	.....	.....	.....	.....	.....	.....
ST. LOUIS, ALTON AND TERRE HAUTE:													
1881.....	175,725	166,012	201,137	197,447	172,177	165,896	165,393	189,180	196,368	204,338	169,795	171,127	2,112,801
1882.....	168,987	149,619	177,609	165,401	162,842	142,742	192,017	236,137	217,659	229,962	206,040	184,526	2,245,320

RAILROAD, TRAMWAY AND CANAL DIVIDEND STATEMENT.

Showing the amount of Stock Outstanding, the Dividend Periods and the date of last Dividend.

Marked thus (*) are leased roads.	Stock out- standing.	Divide'd Periods.	Last Dividend Payable.	Marked thus (*) are leased roads.	Stock out- standing.	Divide'd Periods.	Last Dividend Payable.
Albany and Susquehanna*.....	3,500,000	semi-an	July 1, '83 2	Lehigh Valley.....	50 27,496,895	q'arterly	Apr. 16, '83 2
Atchafson, Topeka and Santa Fe.....	56,932,200	q'arterly	May 15, '83 1 1/2	Little Miami.....	50 106,300	q'arterly	Apr. 16, '83 2 1/2
Atlanta and Charlotte Air Line.....	1,700,000	semi-an	Mar. 5, '83 2	Little Schuylkill*.....	50 4,637,300	q'arterly	June 10, '83 2
Atlanta and West Point.....	1,232,200	semi-an	Feb. 1, '83 6 1/2	Long Island.....	50 2,646,100	semi-an	Jan. 12, '83 3 1/2
Atlantic and St. Lawrence*.....	5,484,000	semi-an	Mar. 15, '83 3 1/2	Louisville & Nashville.....	100 25,000,000	q'arterly	May 1, '83 4
Augusta and Savannah.....	1,032,200	semi-an	Dec. 4, '82 3 1/2	Lowell & Andover.....	100 500,000	semi-an	Feb. 1, '83 3
Baltimore & Hanover.....	88,805	semi-an	Apr. 9, '83 3	Lykens Valley.....	20 600,000	q'arterly	Jan. 1, '83 3 1/2
Baltimore and Ohio.....	14,792,566	semi-an	July 1, '83 5	Maine Central.....	100 3,603,300	semi-an	Feb. 15, '83 2 1/2
Washington Branch.....	5,000,000	q'arterly	May 1, '83 5	Manchester & Lawrence.....	100 1,000,000	semi-an	May 1, '83 5
Berkshire.....	600,000	annual	Apr. 2, '83 1 1/2	Manhattan.....	100 13,000,000	q'arterly	Apr. 2, '83 1 1/2
Boston and Albany.....	20,000,000	q'arterly	May 30, '83 2	1st pref.....	100 6,500,000	q'arterly	Jan. 2, '83 1 1/2
Boston & New York Air Line pref.....	2,795,227	semi-an	Apr. 15, '83 2	2d pref.....	100 6,500,000	q'arterly	Feb. 15, '83 4
Boston, Concord & Montreal pref.....	800,000	semi-an	May 15, '83 3	Marquette, Houghton & Ontonagon.....	100 2,756,600	semi-an	Feb. 15, '83 4
Boston and Lowell.....	3,792,000	semi-an	Jan. 1, '83 4 1/2	Massachusetts.....	100 2,259,026	semi-an	Feb. 15, '83 4
Boston and Maine.....	7,000,000	semi-an	May 15, '83 4	Metropolitan.....	100 400,000	semi-an	Feb. 1, '83 3
Boston & Providence.....	4,000,000	semi-an	May 1, '83 4	Michigan Central.....	100 6,500,000	q'arterly	Oct. 2, '82 1 1/2
Attleborough Branch.....	131,700	semi-an	Jan. 1, '83 3 1/2	Middlesex Central.....	100 18,738,204	semi-an	Feb. 1, '83 1
Boston, Revere Beach & Lynn.....	419,400	semi-an	Jan. 1, '83 3	Mill Creek & Minehill*.....	50 280,000	semi-an	Feb. 1, '83 3
Buffalo, New York & Erie*.....	950,000	semi-an	June 1, '83 3	Mine Hill & Schuylkill Haven*.....	50 323,000	semi-an	July 1, '83 5
Buffalo, New York & Philadelphia pf.....	6,000,000	q'arterly	June 25, '83 1 1/2	Missouri Pacific.....	50 4,022,500	semi-an	Jan. 12, '83 3 1/2
Camden & Atlantic.....	377,400	q'arterly	Nov. 1, '82 4	Morris and Essex.....	50 30,000,000	q'arterly	July 2, '83 1 1/2
Camden & Burlington County.....	880,650	q'arterly	Nov. 1, '82 3	Mount Carbon & Port Carbon.....	50 15,000,000	semi-an	July 2, '83 3 1/2
Canada Southern.....	381,925	semi-an	Jan. 1, '83 3	Nashua and Lowell.....	50 282,350	semi-an	July 2, '83 6
Cape May & Millville*.....	15,000,000	semi-an	Feb. 1, '83 2 1/2	Nashua & Rochester.....	100 800,000	semi-an	May 1, '83 4
Catawissa.....	447,000	annual	Oct. 1, '82 2 1/2	Nashua & Decatur.....	100 1,305,800	semi-an	Apr. 2, '83 1 1/2
new pref.....	1,159,500	semi-an	May 16, '83 3 1/2	Nashville & Chattanooga & St. Louis.....	100 1,356,632	semi-an	June 10, '83 3
Cayuga and Susquehanna*.....	589,110	semi-an	May 16, '83 3 1/2	Naugatuck.....	50 6,670,325	semi-an	Apr. 20, '82 1 1/2
Cedar Rapids & Missouri River*.....	6,850,400	q'arterly	May 1, '83 4 1/2	Nesquehoning Valley*.....	100 2,000,000	semi-an	Jan. 15, '83 5
Central of Georgia.....	769,600	semi-an	Feb. 1, '83 3 1/2	New Castle & Beaver Valley*.....	50 1,500,000	q'arterly	Mar. 1, '83 3
Central Ohio*.....	7,500,000	semi-an	June 25, '83 4	New London Northern*.....	100 700,000	q'arterly	July 1, '83 1
Central of New Jersey*.....	2,437,950	semi-an	Jan. 31, '83 3	New York Central & Hudson River.....	100 8,428,330	q'arterly	July 16, '83 2
Central Pacific.....	411,550	semi-an	Jan. 31, '83 3	New York Central & Harlem.....	100 8,500,000	semi-an	July 2, '83 4
Cheshire preferred.....	18,563,200	q'arterly	Dec. 1, '83 1 1/2	City Line.....	100 1,500,000	annual	July 2, '83 4
Chicago and Alton.....	59,275,500	semi-an	Feb. 1, '83 3	New York, Lackawanna & Western.....	100 10,000,000	q'arterly	Apr. 2, '83 1 1/2
Chicago and Burlington & Quincy.....	2,153,300	semi-an	Jan. 10, '83 1 1/2	New York, Lake Erie & Western.....	100 77,087,000	annual	Jan. 2, '83 6
Chicago, Burlington & Quincy.....	12,504,500	semi-an	Mar. 1, '83 4	New York, Ontario & Western pref.....	100 7,987,500	semi-an	Jan. 2, '83 5
Chicago, Iowa & Nebraska*.....	4,425,400	q'arterly	Mar. 1, '83 4	New York, Providence & Boston.....	100 15,500,000	q'arterly	Mar. 1, '83 12
Chicago, Milwaukee & St. Paul.....	69,514,191	semi-an	June 15, '83 2	Niagara Bridge & Canandaigua*.....	100 2,000,000	semi-an	May 10, '83 2
Chicago & Northwestern.....	3,916,200	semi-an	July 1, '83 4	North Carolina*.....	100 1,000,000	semi-an	Mar. 1, '83 3
Chicago, Rock Island & Pacific.....	27,904,261	semi-an	Apr. 16, '83 3 1/2	Norfolk & Western pref.....	100 1,000,000	q'arterly	Dec. 15, '82 3 1/2
Cincinnati, Hamilton & Dayton.....	16,540,983	semi-an	June 25, '83 3 1/2	Northeastern (South Carolina).....	50 899,350	q'arterly	Apr. 2, '83 3
Cincinnati, Ind. & St. Louis & Chicago.....	16,737,655	q'arterly	May 1, '83 1 1/2	North Pennsylvania.....	50 4,399,750	q'arterly	May 25, '83 1 1/2
Cincinnati, Sandusky & Cleveland pf.....	22,210,844	q'arterly	Feb. 15, '83 3	Northern Central.....	50 6,500,000	semi-an	Jan. 15, '83 4
Cleveland Columbus, Cincin. & Ind.....	41,960,000	semi-an	Feb. 15, '83 3	Northern New Hampshire.....	100 3,068,400	semi-an	June 1, '83 3
Cleveland & Pittsburgh*.....	6,796,800	q'arterly	July 20, '83 1 1/2	Northern Pacific pref.....	100 41,909,132	semi-an	Jan. 15, '83 11
Columbus & Xenia*.....	11,396,600	q'arterly	Jan. 16, '83 3	Norwich & Worcester*.....	100 2,604,400	semi-an	Jan. 10, '83 5
Columbus, Hocking Valley & Toledo.....	8,000,000	q'arterly	Apr. 16, '83 3	Oregon & Transcontinental.....	100 40,000,000	q'arterly	Apr. 10, '83 1 1/2
Concord.....	428,850	semi-an	May 1, '83 3	Old Colony.....	100 7,533,800	semi-an	Jan. 1, '83 3 1/2
Concord and Portsmouth*.....	14,991,800	q'arterly	June 1, '83 2	Oregon Improvement Co.....	100 5,000,000	semi-an	Mar. 1, '83 3 1/2
Connecticut & Passumpsic Rivers.....	11,235,430	q'arterly	June 10, '83 1 1/2	Oregon Railway & Navigation Co.....	100 18,000,000	q'arterly	May 1, '83 3 1/2
Connecticut River.....	1,786,200	q'arterly	Jan. 10, '83 2 1/2	Oswego & Syracuse.....	100 1,320,400	semi-an	Feb. 1, '83 4 1/2
Cumberland Valley.....	10,316,500	semi-an	May 1, '83 5	Panama.....	100 7,000,000	semi-an	Jan. 10, '83 6 1/2
1st pref.....	350,000	semi-an	July 1, '83 3 1/2	Paterson & Hudson*.....	100 630,000	semi-an	Jan. 3, '83 4 1/2
2d pref.....	2,244,400	semi-an	Feb. 1, '83 3	Patterson & Ramapo.....	100 248,000	semi-an	July 1, '82 4
Danbury & Norwalk.....	2,370,000	semi-an	Jan. 1, '83 4	Pemberton & Hightstown*.....	50 342,150	semi-an	July 1, '83 3
Dayton and Michigan*.....	1,292,950	q'arterly	July 2, '83 2 1/2	Pennsylvania.....	50 85,751,550	semi-an	May 29, '83 4
Delaware*.....	241,000	semi-an	Apr. 2, '83 4	Peoria & Bureau Valley*.....	100 20,000,000	semi-an	June 15, '83 2
Delaware & Bound Brook*.....	243,000	semi-an	Apr. 1, '83 2 1/2	Philadelphia, Ger. & Norristown*.....	100 1,500,000	semi-an	Feb. 1, '83 4
Delaware, Lackawanna & Western.....	600,000	semi-an	Apr. 1, '83 1 1/2	Philadelphia, Wilmington and Balt.....	100 2,231,900	q'arterly	June 3, '83 3
Denver & Rio Grande.....	1,211,250	q'arterly	July 1, '83 2	Philadelphia, Fort Wayne & Chicago*.....	100 1,259,100	q'arterly	July 10, '83 2 1/2
Detroit, Lansing & Northern.....	1,468,940	semi-an	July 2, '83 3	Special Imp.....	100 17,795,050	q'arterly	Jan. 2, '83 4
Dubuque & Sioux City*.....	1,652,000	q'arterly	May 14, '83 1 1/2	Pittsfield & North Adams.....	100 19,714,285	q'arterly	July 3, '83 1 1/2
European & North American.....	26,200,000	q'arterly	Jan. 20, '83 2	Portland, Saco & Portsmouth.....	100 7,698,500	semi-an	Jan. 1, '83 2 1/2
Fitchburg.....	33,000,000	q'arterly	Jan. 14, '82 1 1/2	Providence & Worcester.....	100 450,000	semi-an	Jan. 15, '83 3
Flint & Pere Marquette pref.....	1,825,600	semi-an	Feb. 15, '83 3	Rensselaer & Saratoga*.....	100 2,500,000	semi-an	July 2, '83 3
Fort Wayne & Jackson pref.....	2,508,380	semi-an	Apr. 16, '83 3	Richmond & Danville.....	100 6,854,100	q'arterly	Aug. 15, '82 2
Georgia.....	5,000,000	semi-an	Jan. 18, '83 3	Richmond & Petersburg.....	100 5,000,000	semi-an	Aug. 1, '82 2
Granite.....	1,709,550	semi-an	July 1, '83 3	Rochester & Genesee Valley*.....	100 1,009,300	semi-an	Jan. 1, '83 3
Greenwich & Johnsonville.....	392,950	semi-an	June 15, '83 2 1/2	Rome, Watertown & Ogdensburg.....	100 5,293,900	semi-an	Sept. 1, '82 1
Hannibal & St. Joseph pref.....	492,500	q'arterly	June 5, '83 1	Rutland preferred.....	100 4,000,000	semi-an	Jan. 2, '83 4
Harrisburg & Lancaster.....	3,000,000	semi-an	May 1, '83 2 1/2	Spuytten Duyvil & Port Morris.....	100 980,000	semi-an	May 1, '83 7
Hartford & Connecticut Western.....	500,000	q'arterly	June 10, '83 1 1/2	St. Louis, Alton & Terre Haute pref.....	100 2,468,400	semi-an	Feb. 1, '83 3 1/2
Housatonic pref.....	1,998,400	semi-an	Apr. 1, '83 2 1/2	St. Louis & San Francisco 1st pref.....	100 4,500,000	semi-an	Aug. 1, '82 4 1/2
Illinois Central.....	2,500,000	semi-an	Jan. 1, '83 6 1/2	St. Louis, Jacksonville & Chicago.....	100 1,293,000	semi-an	Aug. 1, '82 4 1/2
Iowa Falls & Sioux City*.....	3,100,000	semi-an	July 1, '83 3	St. Paul & Duluth pref.....	100 1,034,000	semi-an	Jan. 1, '83 3 1/2
Iowa R.R. & Land Co.....	4,950,000	semi-an	July 16, '83 3 1/2	St. Paul, Minneapolis & Manitoba.....	100 5,121,700	q'arterly	May 1, '83 2
Jeffersonville, Madison & Indianapolis.....	4,950,000	semi-an	May 4, '82 2	Schuylkill Valley*.....	100 576,050	semi-an	Jan. 15, '83 3 1/2
Joliet and Chicago*.....	2,284,800	q'arterly	Apr. 15, '83 2 1/2	Seaboard & Roanoke.....	100 1,302,200	semi-an	May 1, '83 5
Kansas City, Fort Scott & Gulf.....	1,250,000	semi-an	Jan. 1, '83 3	Shamokin Valley & Pottsville.....	100 869,450	semi-an	Feb. 1, '83 3
Lake Shore & Michigan Southern.....	118,000	semi-an	Jan. 1, '83 4	Shore Line*.....	100 1,000,000	semi-an	Jan. 6, '83 4
Lawrence*.....	5,083,024	semi-an	Feb. 15, '83 3	Sioux City & Pacific pref.....	100 160,000	semi-an	Apr. 2, '83 3 1/2
	1,182,500	semi-an	July 10, '83 3 1/2	South Branch (N. J.).....	100 438,300	semi-an	Jan. 2, '83 3
	3,700,000	q'arterly	Dec. 1, '82 1 1/2	South Western (Ga.).....	100 5,031,700	semi-an	July 26, '82 3 1/2
	1,180,000	q'arterly	Apr. 15, '83 2	Stockbridge & Pittsfield*.....	100 448,700	q'arterly	Apr. 2, '83 1 1/2
	39,000,000	semi-an	Mar. 1, '83 4	Sunbury & Lewistown.....	50 161,000	semi-an	Apr. 2, '83 3
	4,623,500	q'arterly	June 1, '83 1 1/2	Syracuse, Binghamton & New York*.....	100 2,500,000	semi-an	Feb. 1, '83 2
	7,620,000	q'arterly	May 1, '83 1	Terre Haute & Indianapolis.....	100 1,088,150	semi-an	July 10, '83 2 1/2
	2,000,000	q'arterly	May 1, '83 1 1/2	Union Pacific.....	100 60,854,105	q'arterly	Nov. 1, '82 3
	1,500,000	q'arterly	Feb. 15, '83 1 1/2	Utica, Shenango & Susq. Valley.....	100 21,090,100	q'arterly	Mar. 31, '83 3
	4,648,000	semi-an	Feb. 15, '83 3	Utica and Black River.....	100 1,772,000	semi-an	Apr. 7, '83 3
	2,750,000	semi-an	May 15, '83 2	Vermont & Massachusetts.....	100 3,050,000	annual	Jan. 2, '83 3
	19,466,500	q'arterly	Feb. 1, '83 5				
	533,500	q'arterly	July 1, '83 2				
	450,000	q'arterly	July 1, '83 2				

RAILROAD, TRAMWAY AND CANAL DIVIDEND STATEMENT.

(CONTINUED.)

Showing the amount of Stock Outstanding, the Dividend Periods and the date of last Dividend.

Marked thus (*) are leased roads.	Stock outstanding.	Divide'd Periods.	Last Dividend Payable.
Ware River.....	100	750,000 semi-an.	July 3, '83 3%
Warren (N. J.).....	100	1,800,000 semi-an.	Apr. 1, '83 3%
West Jersey.....	50	1,375,800 semi-an.	Mar. 15, '83 3%
Wilmington & Weldon.....	100	2,082,400 semi-an.	Jan. 15, '83 3%
Wilmington, Columbia & Augusta.....	100	960,000 semi-an.	Jan. 10, '83 3%
Winchester & Potomac.....	100	180,000 semi-an.	Jan. 1, '83 3%
Winchester & Strasburg.....	100	74,700 semi-an.	Jan. 1, '83 3%
Worcester & Nashua.....	75	1,789,800 semi-an.	Jan. 1, '83 1%
TRAMWAYS.			
Baltimore City.....	25	1,000,000 annual	Jan. 1, '83 3%
Baltimore, Catonsville & El. Mills.....	100	80,000 semi-an.	Jan. 1, '83 2%
Bleeker Street & Fulton Ferry.....	100	900,000 semi-an.	July 1, '82 3%
Boston & Chelsea pref.....	50	110,000 semi-an.	Apr. 1, '83 3%
Broadway (Brooklyn).....	100	250,000 semi-an.	Apr. 1, '83 3%
Broadway & 7th Avenue (New York).....	100	2,100,000 q'terly	Apr. 1, '83 2%
Brooklyn City & Newtown.....	100	880,600 q'terly	Apr. 1, '83 3%
Brooklyn City.....	100	2,000,000 semi-an.	May 1, '83 3%
Bushwick (Brooklyn).....	100	400,000 q'terly	Apr. 1, '83 3%
Cambridge (Mass.).....	100	908,000 semi-an.	Apr. 1, '83 4%
Central Park, North & East River.....	100	1,800,000 q'terly	Apr. 1, '83 2%
Christopher & Tenth Street.....	100	650,000 q'terly	Feb. 1, '83 2%
Citizens' (Phil.).....	100	192,500 semi-an.	Apr. 1, '83 2%
Citizens' (Phg.).....	50	200,000 q'terly	..... 80 14%
Coney Island & Brooklyn.....	100	500,000 semi-an.	July 1, '83 3%
Continental (Phil.).....	100	580,000 semi-an.	Jan. 1, '83 -
Dry Dock, East Broadway & Battery.....	100	1,200,000 semi-an.	May 1, '83 3%
Elighth Avenue (New York).....	100	1,000,000 q'terly	Apr. 1, '83 3%
Forty-second St. & Grand St. Ferry.....	100	748,000 q'terly	May 1, '83 6%
Frankford & Southwark (Phila.).....	50	600,000 semi-an.	Apr. 1, '83 4%
German town, (Phila.).....	50	1,540,902 q'terly	Apr. 1, '83 2%
Girard College (Phila.).....	50	500,000 q'terly	July 1, '71 3%
Grand Street & Newtown.....	100	170,000 semi-an.	Jan. 1, '83 2%
Green & Coates Street (Phila.).....	50	708,650 semi-an.	Apr. 1, '83 3%
Hestonville, Mantua & Fairmount.....	50	299,381 q'terly	Jan. 1, '75 4%
Highland (Boston).....	100	600,000 semi-an.	Jan. 1, '83 4%
Lombard & South Streets (Phila.).....	25	195,000 semi-an.	Oct. 1, '75 4%
Lynn and Boston.....	100	200,000 semi-an.	May 1, '83 4%
Metropolitan (Boston).....	50	1,500,000 semi-an.	Jan. 1, '83 4%
Middlesex (Boston).....	100	650,000 semi-an.	May 15, '83 3%
Ninth Avenue (New York).....	100	797,320 semi-an.	.....
People's (Phila.) pref.....	25	115,250 July 1, '82 2%	
Philadelphia City.....	50	475,000 semi-an.	July 1, '82 4%
Philadelphia and Darby.....	20	200,000 semi-an.	July 1, '81 3%
Philadelphia & Grey's Ferry.....	50	308,000 semi-an.	Jan. 1, '86 6%
Pittsburgh, Allegheny & Manchester.....	50	300,000 q'terly	Oct. 1, '81 3%
Ridge Avenue (Phila.).....	50	420,000 semi-an.	Apr. 1, '83 5%
Second Avenue (New York).....	100	1,099,500 semi-an.	Jan. 1, '83 2%
Second & Third Streets (Phila.).....	50	771,076 q'terly	Apr. 1, '83 4%
Seventeenth & Nineteenth sts (Phila.).....	50	250,000 semi-an.	July 1, '81 3%
Sixth Avenue (New York).....	100	750,000 semi-an.	May 1, '83 4%
Somerville (Boston).....	100	113,000 semi-an.	May 1, '83 3%
South Boston.....	50	600,000 semi-an.	Jan. 1, '83 4%
Third Avenue (New York).....	100	2,000,000 q'terly	May 1, '83 5%
Thirteenth & Fifteenth Sts. (Phila.).....	50	334,529 q'terly	Apr. 1, '83 4%
Twenty-third Street (New York).....	100	600,000 semi-an.	Feb. 1, '83 4%
Union, (Boston).....	50	374,300 semi-an.	Jan. 1, '82 4%
Union, (Phila.).....	100	751,100 semi-an.	Jan. 1, '83 -
West Philadelphia.....	50	750,000 semi-an.	July 1, '77 10
CANALS.			
Chesapeake and Delaware.....	50	2,078,038 semi-an.	June 1, '75 2%
Delaware Division.....	50	674,950 semi-an.	Feb. 15, '83 2%
Delaware and Hudson.....	100	20,000,000 q'terly	June 11, '83 1%
Delaware & Haritan.....	100	5,847,400 q'terly	July 10, '83 2%
Lehigh Coal and Navigation.....	50	11,273,400 semi-an.	June 6, '83 2%
Monongahela Navigation.....	100	1,004,500 semi-an.	Jan. 1, '83 3%
Morris, consolidated.....	100	1,025,000 semi-an.	Feb. 1, '83 2%
" preferred.....	100	1,175,000 semi-an.	Feb. 1, '83 5
Pennsylvania.....	50	4,501,200 June 8, '83 350	
Schuylkill Navigation com.*.....	50	859,100 semi-an.	June 8, '83 700
" pref.....	50	3,200,000 semi-an.	.....
MISCELLANEOUS.			
Adams Express.....	100	12,000,000 q'terly	June 1, '83 2
American Express.....	50	18,000,000 semi-an.	July 2, '83 3
Calumet & Hecla Mining Co.....	50	100,000 q'terly	May 15, '83 5%
Central Mining Co.....	100	..... annual	Feb. 15, '83 3%
Consolidation Coal.....	100	10,250,000 semi-an.	Jan. 27, '82 2
George's Creek Coal & Iron.....	100	..... semi-an.	Jan. 1, '83 3
Maryland Coal.....	100	4,400,000 semi-an.	Feb. 1, '76 1%
Missouri Valley Land Co.....	100	200,000 semi-an.	Jan. 1, '83 6%
National Tube Works.....	100	2,000,000 q'terly	Apr. 1, '83 2
Pacific Mail Steamship.....	100	20,000,000 q'terly	May 1, '83 3
Pennsylvania Coal.....	50	5,000,000 q'terly	May 15, '83 2
Pullman Palace Car.....	100	10,000,000 q'terly	May 15, '83 2
Quicksilver, com.....	100	5,708,700 May 1, '82 4	
" pref.....	100	4,291,300 May 1, '82 6	
Quincy Mining Co.....	25	40,000 sha semi-an.	Feb. 15, '83 6%
Quincy Railroad Bridge.....	100	1,750,000 semi-an.	Jan. 1, '83 5
Sioux City & Iowa Falls L. & L. Co.....	100	500,000 semi-an.	Jan. 1, '83 3%
Spring Mountain Coal.....	100	1,500,000 semi-an.	June 11, '83 3%
Topeka Equipment Co.....	100	255,500 semi-an.	Apr. 1, '83 5
United States Express.....	100	7,000,000 q'terly	May 1, '83 1
Wells, Fargo & Co. Express.....	100	8,250,000 semi-an.	Jan. 1, '83 4
Western Union Telegraph.....	100	80,000,000 q'terly	Apr. 1, '83 1%

FINANCIAL AND COMMERCIAL DEPARTMENT.

NEW YORK, MONDAY, JUNE 11, 1883.

THE rates for money on call on stocks as collateral during the forenoon were $2\frac{1}{2}$ @ 3 per cent.; after 12.30 o'clock the rates were 2½ per cent., and after 2 o'clock, 3 per cent.

The posted rates for foreign exchange were 4.86 @ 4.89½. The actual rates were as follows: Sixty days, 4.85½ @ 4.85½; demand, 4.88½ @ 4.88½; cables, 4.89½ @ 4.89½. Commercial bills were 4.83½ @ 4.84½.

Continental bills were as follows: Francs, 5.18½ @ 5.19½ and 5.16½ @ 5.16½; Reichsmarks, 94½ @ 94½ and 95½ @ 95½; Guilders, 40 @ 40½ and 40½ @ 40½.

Three mortgages from the Cincinnati, Washington and Baltimore (formerly the Marietta and Cincinnati) Railway Company have been filed of record: the first for \$3,040,000 to secure the second mortgage bonds, the second for \$2,270,000 to secure the third mortgage bonds, and the third to secure \$3,500,000 of first income and \$4,000,000 of second income bonds. This is simply carrying out the plan of reorganization of the company.

From the report of the Baltimore and Potomac Railroad Company for the year ending December 31, 1882, which was presented at the annual meeting of the stockholders held in Baltimore on the 6th inst., we learn that the gross earnings were: from the Washington line and Tunnel, \$1,646,077.76 and from the Pope's Creek line, \$50,930.61—total, \$1,097,008.37; the total expenses were: Washington line and Tunnel, \$728,591.35 and the Pope's Creek line \$62,130.30—total, \$790,721.65, showing a gain in operating the Washington line and Tunnel of \$317,486.41 and a loss on the Pope's Creek line of \$11,199.69—the total net earnings being \$306,286.72. Compared with the previous year the gross earnings show an increase of \$120,576.52, and the expenses a decrease of \$50,201.61, making the increase in net earnings \$180,778.13, or 144 per cent.

The treasurer of the Chicago, St. Paul, Minneapolis and Omaha Railroad Company has notified the Stock Exchange that it will issue at its convenience after the 4th of July an additional amount of capital stock, at the rate of \$10,000 per mile of preferred stock and \$15,000 per mile of common stock, as authorized by its articles of consolidation, for the construction of 50.43 miles of new railroad, viz: 40.43 miles from the Superior Branch line in Wisconsin and 10 miles of Bayfield line in Wisconsin, upon which lines consolidated bonds of the company were recently issued and listed. The amount of preferred stock will be \$504,300, and the amount of common stock \$756,400.

According to the report of the Comptroller the total funded debt of the city of New York on the 31st of May was \$131,773,361.69, including \$839,000 debt of the annexed district, and not including \$12,274,734.40 revenue bonds, issued in anticipation of taxes. During the month, warrants were drawn against the city treasury for \$4,017,147.50, making a total for the year of \$18,512,482.52. Since the 1st of January, stocks and bonds have been issued to the amount of \$11,586,974.10. On the 1st inst. the Comptroller redeemed and cancelled \$1,186,000 of the city bonds due and held by the sinking fund commissioners. The list included \$31,000 four per cent. assessment fund bonds, \$216,000 five per cent. (Riverside Drive) assessment bonds, and \$939,000 five per cent. assessment bonds.

From the report of the Northern Central Railway Company, which has just been issued, we learn that the gross earnings of the main line for the year ending December 31, 1882, were \$5,800,176.03, the operating expenses \$3,842,323.05, and the net earnings \$1,957,852.98; to which add receipts from dividends, interest and royalty on coal mines (\$283,969.28)—making the total net receipts \$2,241,822.26. From which is deducted payment to the Pennsylvania Railroad Company, interest, taxes, rents, equipment, etc., \$1,802,425.36—leaving balance to credit of pro-

fit and loss \$439,396.90. Compared with the previous year, the gross earnings of 1882 show an increase of \$356,476.03, with an increase in expenses of \$54,877.14, making the increase in net earnings \$301,598.89, or 18.21 per cent.

The receipts into the Treasury of New Hampshire during the fiscal year ending June 1, 1883 (including \$61,233.48 cash on hand at the commencement of the year) were \$996,909.20; and the disbursements \$792,286.71—leaving cash on hand June 1, 1883, \$204,622.49. The liabilities of the State at the close of the year were \$3,383,060.94, against which there were assets amounting to \$204,909.09—making the net indebtedness \$3,178,151.85, against \$3,330,757.48 at the close of the preceding year, showing a reduction during the year of \$152,605.63. The total revenue of the State during the year was \$492,741.54 and the total expenses \$340,135.89, an excess of revenue over expenses of \$152,605.63, which corresponds with the reduction of debt.

The earnings of the Pacific Mail Steamship Company for the year ending April 30, 1883, were: from Atlantic line, \$799,766.69; Panama line, \$1,844,461.75; Trans-Pacific line, \$715,731.57; Australian line, \$353,199.97—total earnings, \$3,713,159.98; the expenses were: Atlantic line, \$545,854.16; Panama line, \$1,212,143.93; Trans-Pacific line, \$447,796.47; Australian line, \$347,461.93—total, \$2,553,256.49. To the above gross earnings add for subsidies and miscellaneous receipts, \$389,604.71, making the total revenue \$4,102,764.69; from which deduct total expenses, \$3,190,506.79—leaving the net revenue for the year \$912,257.90. The report, which was presented at the annual meeting of the stockholders on the 30th ult., stated that the company had liquidated all its floating debt, and now proposes to pay off the \$1,000,000 seven per cent. bonds held by the Panama Railroad Company—the payments to be made at the rate of \$20,000 per month. The net earnings during the past year have reached nearly five per cent. on the capital stock. The new steamers have been entirely paid for. The company owns twenty-six steamers, the aggregate construction cost of which was \$12,261,041.62. The company now maintains agencies at Aspinwall, Panama, Acapulco, San Francisco, Yokohama, Hong Kong and New York, the total expenses of which last year amounted to \$398,710.04. The liabilities amount to \$21,295,287.87.

The Chief of the Bureau of Statistics at Washington reports that the total values of the exports of petroleum and petroleum products during the month of April, 1883, were \$3,172,492, against \$4,186,955 during the month of April, 1882. For the ten months ending April 30, 1883, \$35,195,865; against \$42,394,212 for the corresponding period of the previous year.

The interest-bearing debt of the United States, May 31, 1883, is \$1,338,229,050; debt on which interest has ceased since maturity, \$8,938,475.26; debt bearing no interest, \$529,042,895.81; interest, \$10,847,050.18—total debt and interest, \$1,887,057,471.25. Of the debt bearing interest, \$33,154,050 are bonds bearing interest at five per cent., continued at three and one-half per cent.; \$250,000,000 at four and one-half per cent.; \$737,584,100 at four per cent.; \$303,132,900 at three per cent.; \$358,000 refunding certificates, four per cent.; \$14,000,000 Navy Pension Fund, four per cent. The debt bearing no interest consists of: Old demand and legal tender notes, \$346,740,026; certificates of deposit, \$11,805,000; gold and silver certificates, \$163,494,271; fractional currency, \$8,003,598.81. The cash in the treasury amounts to \$317,868,062.34; and the total debt, less cash in treasury, to \$1,569,189,408.91, against \$1,574,079,885.51 on the first of May, 1883, a decrease during the month of \$4,890,476.60, and a decrease since the 30th of June, 1882, of \$119,725,051.81. The cash balance available, June 1, 1883, amounts to \$131,549,531.42.

According to the monthly statement of the Chief of Bureau of Statistics at Washington, of the imports and exports of the United States, the excess of the value of exports of merchandise was as follows: Month ended April 30, 1883, \$3,830,865; four months ended April 30, 1883, \$54,671,198; ten months ended April 30, 1883, \$109,246,867; twelve months ended April 30, 1883, \$78,-

463,923. The total values of the imports of merchandise for the twelve months ended April 30, 1883, were \$733,177,431, and for the twelve months ended April 30, 1882, \$708,024,427, showing an increase of \$25,153,004. The values of the exports of merchandise for the twelve months ended April 30, 1883, were \$811,641,354, and for the preceding twelve months, \$777,875,781—an increase of \$33,765,573.

At a conference held on the 7th inst. between the representatives of the holders of the income bonds of the Central Railroad Company of New Jersey and Mr. Gowen, it was agreed that the former should first receive 10½ per cent. for back interest in 6 per cent. scrip, interest from May 1, 1883, convertible into stock of the company on and after January 1, 1885, with proper provision against duplication of interest and dividends for the same period. Second, that the present bond shall be stamped with an agreement that hereafter it shall draw 6 per cent. instead of 7 per cent.; that it shall not be paid until 1908, and that the holder on and after January 1, 1885, and until January 1, 1907, can convert it at par into stock at par, with proper provision against duplication of interest and dividend for the same period.

To secure an issue of \$250,000 of first mortgage bonds, payable in forty years, with interest at the rate of six per cent. per annum, the Central Crosstown Railroad Company of this city has mortgaged its rolling stock, buildings, franchises, etc., to the American Loan and Trust Company of this city.

The earnings of the Boston, Concord and Montreal Railroad for the year ending March 31, 1883, were \$920,195.43, the expenses \$697,651.33, and the net earnings \$222,540.10—showing an increase in earnings during the year of \$17,288.58, with an increase in expenses of \$28,493.79, making the decrease in net earnings \$11,205.21.

The gross earnings of the Ogdensburg and Lake Champlain Railroad for the year ending March 31, 1883, were \$653,720.95, the operating expenses \$450,758.06, and the net earnings \$202,962.89, from which was paid interest to the amount of \$184,594.75. Compared with the previous year the gross earnings show an increase of \$34,442.56, with an increase in operating expenses of \$12,288.30, making an increase in net earnings of \$22,154.26.

From the report of the Chicago, Rock Island and Pacific Railway Company, which was submitted to the stockholders at their annual meeting in Chicago on the 5th inst., we learn that the gross earnings for the fiscal year ending March 31, 1883, were \$12,189,902.81, the operating expenses \$7,109,816.38, and the net earnings \$5,080,086.43. To this is to be added the net cash receipts from land sales, amounting to \$560,000, making a total net revenue of \$5,640,086.43. After paying interest on the bonded debt, rentals of leased lines, and four quarterly dividends of 1½ per cent. each, the amount of \$1,300,000 was ordered carried over to the "addition and improvement account."

Cattle Injuring Railway Trains.

AN ox was allowed by the negligence of its owner to stray upon a railroad track, and it threw from the track an engine and some cars and injured them. The company sued the owner for the damages in negligence and was defeated. On an appeal of the case (Annapolis and Elk Ridge Railroad Company vs. Baldwin) to the Court of Appeals of Maryland, the judgment was reversed. Judge Robinson, in his opinion, said: "The defendant is liable. The plaintiff is entitled to the unobstructed use of its road, and defendant admits that his ox was upon the track through his negligence. The injury was the direct result of his negligence. If the negligence is once admitted or established, it is no answer that the defendant did not foresee the injury, or that the damage was greater than he anticipated."

How to write well. First select your pen. See it has Esterbrook's stamp. With good ink, paper and application, the desired result will follow.



The Broadway Underground Railway.

WITHIN two decades three great public enterprises have been projected in New York City—the New York and Brooklyn bridge—the tunnel under the Hudson River connecting New York and

Jersey City, and last but not least, the Broadway Underground Railway. The first is finished or nearly so, the second is in course of construction, and preliminary work upon the last is being pushed with vigor.

The line of the proposed Broadway Underground or Arcade

Railway is: Beginning at the Battery Park and Bowling Green, under Broadway, to Twenty-third street—there a branch will extend up Madison avenue to Harlem; thence along the Harlem river to a point near Kingsbridge; thence across the river, connecting with railroads on the northern and eastern sides of it. This branch will also connect with the Grand Central depot at Forty-second street. Another branch, beginning likewise at Twenty-third street, will extend up Broadway to Fifty-ninth street at the junction of Eighth avenue; thence along the Boulevard to 126th street, thence to connection of Hudson River Railroad.

THE PLAN OF THE ARCADE RAILROAD

is simply to make a double Broadway. The whole street will be excavated to the depth of about seventeen feet for a four track railroad, and twelve feet under the present sidewalks for duplicate sidewalks by the side of the railroad beneath, on a level with the platform of the cars. The roadway will then be replaced at its present level by arches of solid masonry rendered water-tight by impervious asphaltum coating, resting on iron columns, and covered with a solid wagon-way of the very latest and most approved pattern. This road-bed will never need to be disturbed until worn out. During the day the railroad will be lighted from above, through six feet width of open area on each side, which the law now allows adjoining every building and also through bull's eyes of glass along the curbstone, or the whole sidewalk may be made of glass, as in front of the "Florence" at Fourth avenue and Eighteenth street, and upper floors of many arched buildings in lower Broadway.

Besides the open areas, ventilation will be had through similar spaces at the corners of the street entrances and stairways. The stairs will be only twelve feet high, less than half the height of the average stairs of the Elevated Railways, while the cars will be rendered still more accessible by the elevators in the stores on every block, which will doubtless be sent down to the basement. At night the whole roadway will be rendered resplendent by electricity. Upon the lower road-bed will be built

FOUR TRACKS,

the two inside to be used for express trains, to stop only once in about a mile, and the two outside for way passenger trains, the trains upon which run as fast as the elevated cars now do. The express trains will run from the Battery to Harlem River in from fifteen to twenty minutes.

FOUNDATION OF BUILDINGS.

The foundation of every building on Broadway erected within the last twenty years is sufficiently low not to be disturbed by the proposed excavation. A few old buildings will have to be shored up and their foundations deepened, a common building operation nowadays. In fact, the foundations of the buildings would be far less disturbed by the Arcade plan with its shallow excavation, than by the construction of a tunnel road, such as the company now has the right to build, twenty-five or thirty feet under Broadway. Of course, in the light of the fact that Chicago has been raised bodily while business went on uninterruptedly in the buildings, and that in riding down Broadway one frequently sees thirty-foot excavations for new buildings adjoining thin side walls with insufficient foundation, it will not be seriously claimed that the matter of excavation is an obstacle to the construction of the Arcade Railroad. Indeed, the Commissioners themselves in their report against a tunnel road, which would encounter far greater obstacles, speak as follows on this point: "But it appears to be well and sufficiently proven that the present state of the science of engineering is such that a sufficient amount of time and money and the use of adequate means are the only limitations to the successful performance of the work proposed."

THE CONSTRUCTION OF THE ROAD

will be commenced by placing along the line of the roadway two iron bridges, as shown in the picture, of about 300 feet long, each 18 feet wide in the clear, and along the line of sidewalks

corresponding bridges, each 12 feet wide; these bridges to be supported at intermediate points. The floor of these bridges will be elevated four feet above the grade of the street, and the difference in elevation overcome by a gentle ascent at each end. These trusses are skeleton frames, and will form but slight obstruction to the view, and will permit pedestrians to cross the streets at all places. The panels are made separate and bolted together, and may be taken down from one and added to the other with great facility.

Convenient access to and from the bridges will be provided for, and the work on the railway will be carried on beneath, without using the street either in the removal of the excavated ground or in bringing materials to construct the road; the completed arcade being ample for these uses, and affording abundant storeroom for all the purposes of construction.

The street in front of a good sized building would be occupied by the bridges and the workmen but a week or two, and during this time (by the plan proposed) the occupants of the building would suffer but little inconvenience, and the street travel but little obstruction.

There will be no interruption of the sewage system or of the water and gas supply along the route, but the water pipes, gas pipes, sewers, telegraph and telephone wires, electric light wires, pneumatic tubes and all devices for the cleansing of the streets and the accommodation of the public will be provided for in the Arcade structure itself, where they will be out of the way and yet perfectly accessible at any time for the purpose of adjustment or repair without disturbing the surface of the streets.

The President of the company is Melville C. Smith, a wealthy owner of real estate. The Trustees, recently elected, are Mr. Smith, William Windom, ex-Secretary of the Treasury; Jerome Fassler, Sr., of Whiteley, Fassler & Kelly, manufacturers of mowing and reaping machines at Springfield, Ohio; H. C. Gardiner, and Edward M. Clymer, President of the Buffalo, Bradford and Pittsburgh Railroad. Mr. Smith said recently that the Board would probably be enlarged by adding two or three prominent Broadway real estate owners.

THE ELEVATED ROADS,

the surface railroads, and the omnibuses at the present time are inadequate at certain hours of the day to supply proper accommodations for the people who fill them. Only about half of them can procure seats, and the others are obliged to stand. The underground road will relieve all this, and meet all possible demands of travel on this circumscribed, river-girt island for all time to come. It meets the fullest needs of rapid transit.

Comptroller Campbell has accepted a bond from the company to the amount of \$100,000 which is to be forfeited to the city if the road is not completed from the Battery to Forty-second street, within four years from the filing of the bond. Mr. Smith intimates, according to their engineer's report, that it can be done by their method of construction in two and a half years.

OPINIONS OF ENGINEERS.

The following is the judgment of several eminent engineers: The Arcade provides complete accommodation for through and way transit of passengers and freight between the extreme limits of the island and along its main artery.

It furnishes an arcade avenue and promenade, well lighted and ventilated, convenient for pedestrians at all times, and with special advantages in warm, cold or stormy weather.

It can be constructed without interruption either to the travel on the street or the convenient use of the buildings adjacent, and without endangering any of the structures along the street, and with arrangements for a better location of the water and gas pipes and sewers than now exists.

The route selected—namely, that along Broadway, is determined by the topography of the island.

*The accompanying sketch of a set of movable bridges by means of which these interruptions will be avoided, was designed by Mr. J. McAlpine.

It in no case occupies or injures any private property, but in nearly all cases greatly enhances the value of the property along its route.

There are no difficulties attending the construction of the work which cannot be overcome by engineering skill, and at a comparatively moderate cost.

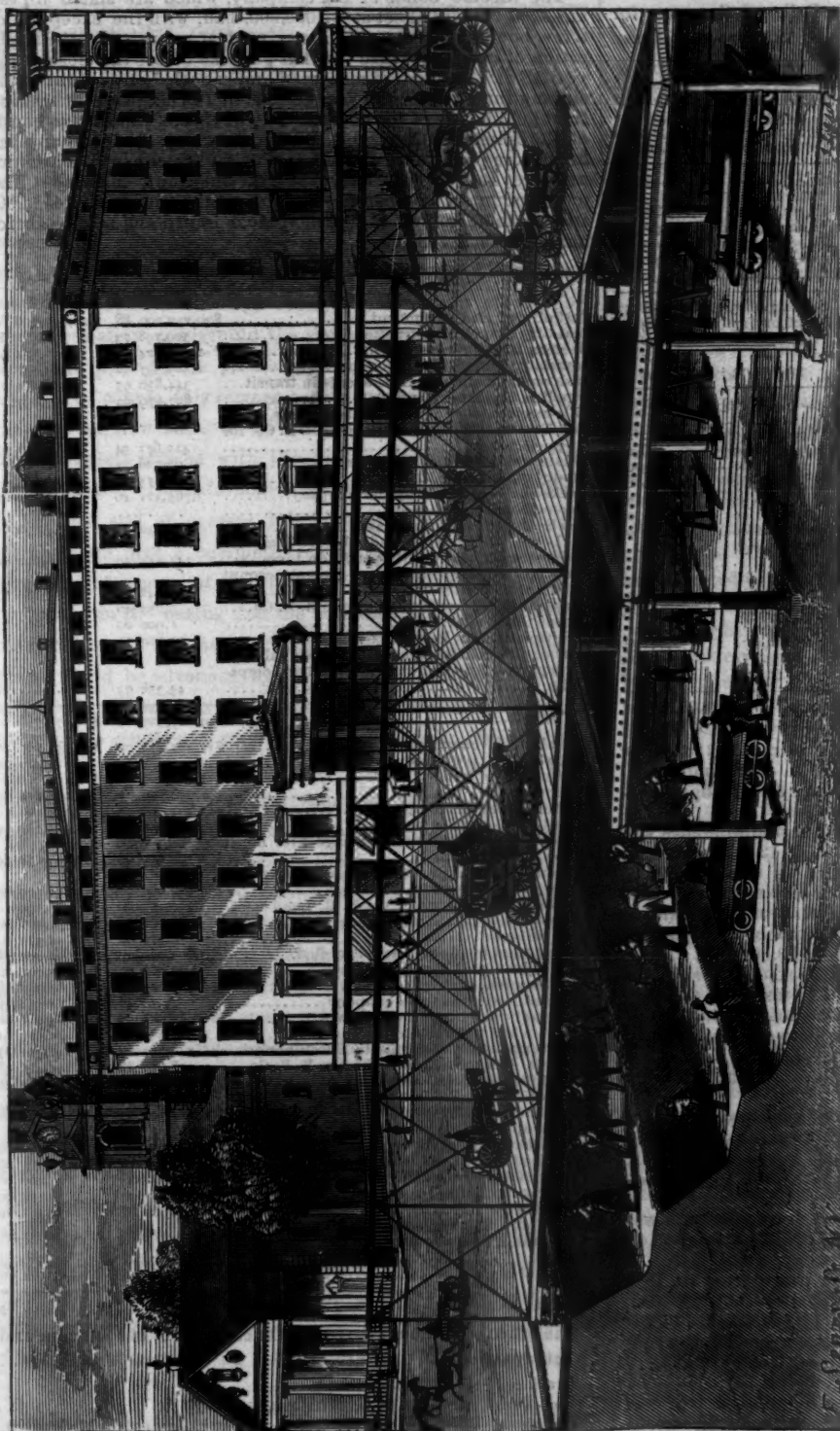
No other city in the world so needs an express railroad throughout its entire length, for there is no other city in the world that is so long and narrow, confined by wide rivers, with the business houses at one end, and the residences so far away at the other, receding in a direct line further and further every year. The promoters of the Arcade road

CLAIM FOR IT THE FOLLOWING ADVANTAGES:

1. It can carry more than 1,000,000 passengers a day at the highest practicable rate of speed.
2. It will combine all the possible conditions of safety.
3. It will have plenty of light and air.
4. It will take none of the surface of the island, and instead of destroying or injuring property will improve and increase it. No matter what remuneration the owner may receive, the destruction of property is a public injury and absolute loss.
5. It will have four times the capacity of any other rapid transit road. It will equally accommodate way travel and through travel, as no double-track can do, frequent stoppages being incompatible with fast travel, and infrequent stoppages inconvenient for way travel.
6. It will furnish to the public free of charge a convenient and always accessible vault for all sewers, pipes, wires and other paraphernalia of the distribution service, which have become, both in the air and in the ground, an intolerable nuisance in the downtown streets.
7. It will provide for easy entrance and exit. And finally,
8. It will create a new sub-surface street and new sidewalks, with twenty-five miles of new basement stores, and by removing trucks and omnibuses from the present surface of Broadway, leaving it free for carriages on a dry and firm pavement, will make it the most beautiful avenue in the world.

This article cannot more fitly conclude than with the following extract from an elaborate report made by a board of engineers of eminence and ability: "Eighty millions of people cross the ferries annually to the lower end of the island, and 200,000,000 come on railways and steamers.

It is for this great multitude, and the myriads who for years to come will throng the busy marts of the world's great metropolis, that we are to provide. What the Erie Canal was to the Empire State; what the Pacific Railway will be to the continent; what the Atlantic cable is to the world—great necessities of modern civilization—such will be the Arcade Railway to the city of New York." And when it



MOVABLE BRIDGE FOR BUILDING THE ARCADE WITHOUT INTERRUPTION TO TRAVEL.

Finally, it meets a necessity in the most complete and unobjectionable manner.

Signed—George B. McClellan, John B. Jarvis, William J. McAlpine, Silas Seymour, Egbert L. Viele, Charles H. Haswell, Julius W. Adams, H. G. Wright, Sylvanus H. Sweet, John Newton, I. F. Quimby.

shall have been completed, and thronged through all the hours of the day and night, instead of being regarded as singular in conception and a wonder in execution, the only marvel will be why it was not done before.

Chicago and Alton Railroad.

The earnings of the Chicago and Alton Railroad Company for the years ending December 31, 1881 and 1882, were as follows:

	1881.	1882.
From passengers.....	\$1,697,541 44	\$1,973,100 66
From freight.....	5,546,369 44	5,948,123 31
From express.....	147,399 20	159,090 46
From mails.....	137,996 35	119,816 93
From miscellaneous.....	27,933 99	15,363 76
Total earnings.....	\$7,557,740 42	\$8,215,495 12
Expenses, viz:		
Conducting transportation.....	\$1,261,139 24	\$1,265,862 00
Motive power.....	1,121,048 10	1,221,417 27
Maintenance of way.....	1,190,932 75	1,273,125 43
Maintenance of cars.....	344,367 95	509,362 93
General expenses.....	232,225 21	216,114 60
Total expenses.....	\$4,149,713 25	\$4,485,881 53
Net earnings.....	\$3,408,027 17	\$3,729,613 59
Add balance from previous year.....	1,500,410 10	1,442,440 66
Received from interest on bonds, dividends, stocks, etc.....	306,791 13	332,547 24
Total net income.....	\$5,215,228 40	\$5,504,601 49
Disbursed as follows:		
Interest on funded debt.....	\$762,001 40	\$761,122 23
Dividends, March and September.....	1,077,976 00	1,083,080 00
Rent Joliet and Chicago Railroad.....	131,355 00	117,615 00
Rent St. Louis, Jacksonville and Chicago R. R.....	399,662 65	424,000 00
Rent Louisiana and Missouri River Railroad.....	169,188 95	188,942 37
Rent Kansas City, St. Louis and Chicago Railroad.....	333,788 00	333,977 00
Rent Mississippi River Bridge.....	63,000 00	63,000 00
Paid Wiggins Ferry Co.....	136,763 36	.....
Paid principal of Joliet and Chicago Railroad mortgage bonds.....	.....	306,000 00
Paid sinking fund.....	73,980 00	.....
Paid for sinking fund bonds purchased.....	.....	79,574 06
Paid from this account for real estate, buildings, tracks, etc.....	431,643 74	71,221 56
Suspended accounts written off.....	21,758 89	18,366 12
Paid State, County and municipal taxes.....	171,661 75	198,621 97
Total disbursements.....	\$3,772,787 74	\$3,645,520 31
Balance, December 31.....	\$1,442,440 66	\$1,859,081 18

Compared with the year 1881, the gross earnings of 1882 show an increase of \$657,754.79, with an increase in operating expenses of \$336,168.28, making the increase in net earnings \$321,586.42.

At the close of 1881 the length of main line and branches was 846.36 miles; length of second main track, 60.12 miles; length of side track, 168.87 miles—total length of all tracks, 1,075.35 miles. At the close of 1882 the length of main and branch lines was as follows: Chicago to Joliet (leased), 37.20 miles; Joliet to East St. Louis, 243.50 miles; Coal City Branch, 29.76 miles; Dwight to Washington and branch to Lacon, 79.80 miles; Roodhouse to Louisiana, 38.10 miles; St. Louis, Jacksonville and Chicago (leased), 100.80 miles; Mexico to Kansas City (leased), 162.62 miles; Upper Alton Line, 7.40 miles—total, 849.78 miles; to which add 39.64 miles of second track between Chicago and Joliet, and 20.48 miles between Joliet and East St. Louis, and 173.58 miles of sidings—making the length of all tracks, 1,083.48 miles.

The equipment of the road at the close of each year was substantially the same, viz: 213 locomotives; 105 cars used in passenger trains; 19 Pullman sleeping cars, 3,223 house, 1,348 stock, 1,350 platform and coal, 10 dump, 97 drovers' and 16 tool and boarding cars.

The number of miles run by passenger trains in 1882 was 1,550,018, and by revenue freight trains, 2,513,523—a total of 4,063,541, against 3,903,362 in 1881, an increase of 160,179.

The number of tons of revenue freight transported in 1882 was 3,522,840, of which 772,975 was through and 2,749,865 local; in 1881 the freight tonnage was 3,275,004, of which 799,051 was through and 2,475,953 local—showing a decrease in through freight of 28,076 tons, and an increase in local freight of 273,912 tons, the total increase in freight tonnage being 247,836. The number of tons of paying freight carried one mile in 1882 was 474,823,908, against 447,009,977 in 1881, an increase of 27,813,931 tons. The tonnage of coal transported was 1,366,641, an increase over the previous year of 176,400 tons. The average rate per ton per mile on revenue freight was 1.261 cent, against 1.241 cent in 1881. Average distance each ton was carried, 134.78 miles; do. in 1881, 136.49 miles.

The total number of passengers carried in 1882 was 1,666,991, of whom 123,600 were through and 1,543,391 local; in 1881 the

number carried was 1,495,606, of whom 123,743 were through and 1,371,863 local—a decrease in through passengers of 143, and an increase in local passengers of 171,528, the total increase in passengers being 171,385. Number of passengers carried one mile in 1882, 101,150,959; do. in 1881, 92,847,464, an increase of 8,303,495. The average rate per mile paid by all passengers in 1882 was 1.951 cent, against 1.828 cent in 1881. Average distance traveled by each passenger, 60.72 miles; do. in 1881, 62.07 miles.

The income bonds of the company, which are stated in the annexed balance sheet at \$1,096,000, had, with the exception of a few bonds not presented, been paid at maturity by the application of funds provided for that purpose before the close of the year 1882. There were redeemed and canceled on account of the sinking fund during the year \$69,000 of the six per cent sinking fund gold bonds of the company. The \$306,000 mortgage bonds of the Joliet and Chicago R. R. Co., on which this company has heretofore paid interest at the rate of eight per cent per annum, matured July 1, 1882, and were redeemed and canceled. The total amount of bonds redeemed during the year was \$1,458,000; and the total amount of common stock issued and sold to shareholders was \$1,323,200.

GENERAL BALANCE SHEET, DECEMBER 31,

	1881.	1882.
Cost of road and equipment.....	\$20,222,700 88	\$20,222,700 88
Coal City Branch construction.....	500,798 73	508,461 35
Western Division construction.....	1,116,724 91	1,116,724 91
Louisiana Branch construction.....	1,389,537 92	1,389,537 92
Cash on hand and due from agents in transit.....	244,830 95	2,356,154 79
Supplies, machinery and tools.....	827,979 22	605,037 18
Bills receivable—including, in both years, notes of Louisiana and Missouri River R. R. Co. for \$311,187.96.....	412,671 54	380,581 07
Trustees sinking fund mortgage.....	22,626 71	22,626 71
Sundry other trusts.....	206,475 84	83,875 84
Stocks and bonds held by the company.....	3,765,421 40	3,732,221 40
Income bonds purchased.....	.....	15,500 00
Sinking fund bonds purchased.....	39,930 75	4,636 69
St. Louis, Jacksonville and Chicago Railroad construction account (Upper Alton Line).....	145,455 40	316,022 92
Louisiana and Missouri River—general account and accrued interest.....	109,942 84	89,374 27
Kansas City, St. Louis and Chicago R. R. Co.....	5,252 40	.....
Kansas City Union depot.....	1,000 00	6,666 67
U. S. Government Post Office Department.....	29,620 71	29,646 05
Balance due from foreign roads, individuals and companies, less amount due to other companies, etc.....	43,358 93	.....
Total.....	\$29,183,329 13	\$30,879,768 65
Capital stock, common.....	\$11,181,472 00	\$12,504,672 00
Capital stock, preferred.....	2,425,400 00	2,425,400 00
First mortgage bonds.....	2,400,000 00	2,400,000 00
Income bonds.....	1,006,000 00	1,006,000 00
Sinking fund gold bonds.....	2,874,000 00	2,805,000 00
Consolidated sterling bonds.....	4,379,850 00	4,379,850 00
St. Louis, Jacksonville and Chicago first mortgage bonds assumed.....	564,000 00	564,000 00
St. Louis, Jacksonville and Chicago second mortgage bonds assumed.....	188,000 00	188,000 00
Louisiana and Missouri River R. R. bond acc't.....	439,100 00	439,100 00
Bonds unissued.....	30,000 00	30,000 00
Stock unissued.....	4,572 00	4,572 00
Sinking fund bonds paid and canceled.....	600,000 00	600,000 00
Sinking fund gold bonds redeemed.....	126,000 00	195,000 00
Trustees' cash.....	3,241 39	3,241 39
Unclaimed dividends and coupons.....	1,258 46	1,258 46
Received from sales of locomotives.....	62,900 00	27,400 00
Vouchers and pay rolls to December 31.....	555,754 21	481,014 91
Rent accrued on leased lines to December 31.....	142,741 67	142,741 67
St. Louis, Jacksonville and Chicago R. R. Co.....	128,644 88	134,426 46
Kansas City, St. Louis and Chicago R. R. Co.....	.....	6,363 70
Kansas City, St. Louis and Chicago construction account—unexpended balance.....	268,823 72	251,821 83
Amount appropriated from the K. C., C. & St. L. construction fund for equipment, etc.....	265,216 80	265,216 80
Unclaimed freight and baggage.....	2,321 06	2,321 06
Depot and depot grounds.....	200 00	200 00
Missing sinking fund coupons.....	70 00	70 00
Land Trustee.....	1,322 28	2,431 10
Balance due to foreign roads, individuals, and companies, less amount due from other companies.....	.....	70,586 09
Income account.....	1,442,440 66	1,859,081 18
Total, as above.....	\$29,183,329 13	\$30,879,768 65

The office of the company is at Chicago, Ill. The officers and directors are:

President—T. B. BLACKSTONE.
 Vice-President—JAMES C. McMULLIN.
 Directors—John F. Slater, George Straut, James C. McMullin, John Crerar, Lorenzo Blackstone, John J. Mitchell, T. B. Blackstone, John B. Drake, Morris K. Jesup.
 Secretary and Treasurer—CHARLES H. FOSTER.
 General Manager—CHARLES H. CHAPPELL.
 General Superintendent—W. F. MERRILL.
 Chief Engineer—K. F. BOOTH.
 Purchasing Agent—A. V. HARTWELL.

TRAMWAY DEPARTMENT.

[This department of the AMERICAN RAILROAD JOURNAL is devoted to the interests of Street Railways; and communications, suggestions and items of information relative to their organization, management and appliances are solicited by the editors. All communications should be accompanied by the name and address of the writer. The English nomenclature of "Tramway" is adopted in this department as being of greater convenience and more specific in its meaning than "street railway," though in allusion to individual organizations we shall preserve their corporate titles. It is our hope to nationalize the term Tramway, which is now generally used in every English speaking territory with the exception of the United States.]

UNTIL the publication of a Tramway Department in this Journal, with the exception of an occasional paragraph in the newspapers, the public were left uninformed as to street railways considered as business enterprises. And now, while arrays of authenticated figures present the extent, outlay and profit of railroad enterprises to a nicety, it is vain to search for corresponding information concerning the vastly important interest concerned to provide the public with cheap and convenient street travel. Of course, this remark has no application to the elevated railroads of New York, which are an exceptional provision and more properly classed with the great railroad system of the United States. But information about street railways is difficult to procure, and, at present, it is impossible to print the figures which would give a complete view of the whole business and, therefore, of course, of the very numerous and diverse interests comprised in it. Seeing that the interests of those who supply the public with said service, and of the public in the second place, would be advanced by the collection and comparison of the details of such service, we are pleased to record, on the authority of a gentleman eminent in the street-car business, that before long a blank form will be sent out, at least to those roads that are members of the American Street-Railway Association, requesting data in reference to equipment and construction, so that useful and profitable comparisons can be made relative to the cost of equipment and construction in various localities and with the use of different materials, especially, also, in regard to the cost of feed for horses. Another object sought in the proposed sending out of said circular will be to compare the cost of horse power with that of steam, whether by dummy or the cable system. As we are quite sure that the value of such inquiry is patent to all interested in street-railway enterprises, there is no necessity of our enlarging upon the advisability of their submitting as full answers to the proposed inquiries as they can, with the view to the common advantage of all engaged in the business. The greater the perfection of tramway service attained, the higher must prove the public appreciation of its importance and convenience, and the profit of the business will be increased accordingly. We regard the announcement we are enabled to make as one of great importance, and shall await the results of the proposed inquiry with hopeful interest.

In his veto of the Street Railroad Bill, Governor CLEVELAND gives as his principal objection to it that it applies too largely to interests in New York City. In his memorandum of disapproval he expresses the opinion that "it cannot be difficult to frame a bill which in spirit, as well as in strict construction, would be a general law, protecting all localities alike, and avoiding the evils

sure to follow a furtive attempt, under the guise of a general statute, to answer only private and local purposes." The difficulty seems to be to reconcile loyalty to the Governor's wholesome doctrine with the profitable grinding of the proverbial ax.

Traction Railways.

THE receipt of a pamphlet entitled "Cable Railway Company's System of Traction Railways for Cities and Towns," and the interest attaching to the construction of a traction railroad over the New York and Brooklyn Bridge, give opportuneness to the presentation of certain facts collected upon a review of the pamphlet the title of which is quoted.

It is a publication of the Cable Railway Company of San Francisco, which was incorporated April 16, 1881, for the purpose of introducing throughout the United States the system of cable railways, matured by Mr. A. S. Hallidie, and as operated in San Francisco. The company is the exclusive owner of sixteen United States letters patent, including all those granted to Mr. A. S. Hallidie. It has provided traction railways in San Francisco and Chicago, on a grand scale, and with results giving superior street travel to the inhabitants of those cities, and, as will be seen presently, a profitable return to the various companies engaged in operating said railways.

Mr. Hallidie's system was first put in use by the Clay Street Hill Railroad Company, in San Francisco, August, 1873, since which time it has been constantly running, and has been found to answer all requirements, and to exceed the expectation of engineers and others who had examined the plans of the inventor. It is adapted to all kinds of metropolitan railroading, where the surface of the streets has to be kept free from obstructions and open to ordinary traffic, where locomotive steam engines are not permitted, or where the streets are so steep as to make the use of horses difficult or impossible. The system consists of an endless wire rope placed in a tube below the surface of the ground, between the tracks of a railroad, and kept in position by means of sheaves, upon and beneath which the rope is kept in motion by a stationary engine, the power being transmitted from the motor to the rope by means of grip or other suitable pulleys, and from the rope to the cars on the street by means of a gripping attachment fixed to a grip-car or dummy, and connected by a thin bar, which passes through a narrow slot in the upper side of the tube.

It presents no impediment to ordinary travel. The rope is grasped and released at pleasure by a gripping device attached to the passenger car, and controlled by a man in charge. The car is more smoothly started than by horses, and instantly stopped on any part of the road; its mechanical construction is simple and easily controlled, and on the streets of a city it does not frighten horses or endanger lives. Wire rope, we may add, without which it would be difficult to work cable railroads economically and successfully, was the invention of Mr. Andrew Smith, a native of Scotland, who experimented with the use of metal wire for ropes in 1828, and took out his first patent in Great Britain, January 12, 1835. Since then the material from which wire is made has been improved, until now steel wire is made capable of sustaining a tensile strain of 120 tons per square inch area.

As to the all-important question of cost, our authority informs us that the total cost per mile of equipment and construction of the Hallidie cable railway double track, is \$51,899.56. If the costs of administration, office work and extras are considered to be the same under both the horse and cable systems, an elaborate comparison between them places the running expense of a horse road, three miles, double track, speed four and a half miles per hour, thirty-two cars, headway two and a half minutes, at \$138,880.00, or \$380.50 per day, which, at five cents per passenger, would require 7,610 passengers per day to pay expenses. If the line carried its full seating capacity, and ran eighteen hours per day on two and a half minutes headway, it would carry daily

9,504 passengers at five cents, equal to \$475.20. The annual running expenses of a cable railway, three miles double track, speed six miles per hour, twenty-four cars and twenty-four dummies, leaving every two and a half minutes, are found to be \$88,246.71, or \$50,633.29 less than the expenses of the horse road. Moreover, the cable road, in the same number of hours, under the same headway, would seat 19,008 passengers, at five cents, \$950.40, making a daily earning of \$475.20 more than the horse road, or an actual gain of \$171,073, which added to the \$50,633.29 saved in running expenses, would effect a total annual saving by the cable system as compared with the horse system, of \$221,705.29.

These figures demonstrate the wisdom of horse-car companies looking with attention into the subject of cable railways. We cordially commend to their examination the pamphlet reviewed in this article.

The One-Horse Car.

THE following letter, addressed to the publishers by the John Stephenson Company, speaks for itself. We believe in giving both sides a hearing:

No. 47 E. 27TH ST., NEW YORK, June 2, 1883.

Phenix Publishing Co., No. 245 Broadway, New York City.

GENTLEMEN:—We regret to see that the AMERICAN RAILROAD JOURNAL is misleading the public regarding the use of small tram-cars. You say the popular prejudice is strong against them everywhere." The best statistics and sources of information accessible to us show that in the United States and Canada there are about 428 tramways, of which Canada has about a dozen. Of these 428 roads, 279 are operated with small ("bob-tail") cars and 149 are operated with large (conductor) cars. A reference to our order-book for the year 1882 showed that two-thirds of our orders were for small cars. The small car system is a boon to the public because: One. Tramways accommodate the public, where otherwise they could not exist. Two. The accommodation is better because usually three (3) small cars are used successfully where the effort to sustain two (2) has proved a failure. Three. Economy of time equal to fifteen to twenty per cent., because the small cars make fewer stoppages, and being lighter, are stopped and put in motion more quickly, and Four. Merciful to horses. Two horses seldom start in unison. In the bob-tail car the one horse easily does the work, with better footing in the track.

Coaches to Connect With Street Cars.

THE Wilmington City Passenger Railway Company will run a coach line on Market street from Twenty-third to Tenth, where a connection will be made with the street cars. Passengers will be carried between Twenty-third and Market streets and the P. W. & B. railroad station, the Middle Depot or the Eleventh street bridge for a single fare. One coach has been put on the line. The number will be increased as rapidly as other coaches can be got ready until they run on fifteen-minute time and connect with every alternate car on the passenger railway, over which the cars will begin to run on their new schedule with seven and a half minutes' interval in a few days.

Steam for Street Railways.

THE London Street Tramways Company, one of several companies doing a street railway business in the English metropolis, has adopted compressed air engines to propel its cars. Recently the company made a trial of the Mekarski air engines before a large party of gentlemen interested in street railways. The engine has been used independently in England for some time, but as applied to street railway cars has only now been introduced. It has, however, been used very successfully for the last four

years at Nantes. The engine was applied to one of the ordinary cars of the company, and the car ran smoothly and well over the whole line, including some steep gradients and sharp curves. The speed obtained was satisfactory, and it was found that the car could be stopped in little more than its own length. There is no steam visible, and no disagreeable smells apparent. The Tramway Company's opinion upon the financial aspect of the question may be judged from the fact that they have resolved to fit the Mekarski engines to all the cars, thus entirely superseding horseflesh by compressed air. We commend the idea to the notice of some of our own street railway managers.

Running Street Cars to the Bridge.

A NEW street car connection with the Bridge has been made in Brooklyn by the Prospect Park and Coney Island Railroad Company, whose street car line runs from Fulton Ferry to Ninth avenue and Twentieth street, principally in Park and Vanderbilt avenues. A force of men laid a track in Concord street, from Bridge street to Washington street, connecting the line already in use in Bridge street with the line of the Brooklyn City and Newtown Railroad Company in Washington street, running past the Bridge terminus. A. R. Culver, president of the company, said that the cars would still run on the old route down Gold and Front streets to Fulton Ferry, returning in Water, Bridge and Concord streets, to Gold street.

The Brooklyn City Railroad Company is preparing its new car-stand adjoining the Sands Street Bridge Station on the west side. Rails and switches will be laid shortly. The Atlantic Avenue Railroad Company is grading the ground for its car-stand at the southeast corner of Sands and Washington streets, and will put down the tracks in a short time.

Market Street Cable Railway, Philadelphia.

CHIEF SURVEYOR SMEDLEY, Chief Commissioner Estabrook and Chief Engineer Ludlow, of the Survey, Highway and Water Departments, yesterday examined the plans for a cable road on Market street, submitted by President Widener and Engineer George Rice. President Widener explained that the road would be similar to that of the Union line on Columbia avenue, and would involve an outlay of \$3,000,000. The conduit would be of wrought iron and the space between the tracks paved with cubical blocks. Highway Commissioner Estabrook, while in favor of the plans, desired to know if the clicking noise noticed in cable roads could be obviated. He was assured by Engineer Rice that this would be overcome by laying the conduit two feet nine inches below the surface of the street. The Department heads expressed satisfaction with the plans, but postponed formal approval until the District Surveyors submitted fuller plans, showing the exact location of the road, and the water and gas pipes and sewers with which it would come in contact.

Legislation for Cable-Power Railway.

Of course, the street railway companies should be kept within proper city regulation by all reasonable means; but there is such a thing as carrying restrictive measures rather too far. This is the case with an addition to Senate bill No. 111 now in the House, which is intended to enlarge the General Corporation act of 1874 so as to admit the formation of companies to furnish motive-power for cable railways. If it is the will of the Legislature to encourage the formation of such companies under a general law, as it should be, then the authority should be granted without any hindering restrictions that must defeat the main purpose of the measure. There can be no doubt that the cable method of propulsion is the best substitute for horse-power yet brought into operation for street railways; there is equally no doubt that it must inure to the benefit of the public in sundry ways; it is

reasonably certain that it cannot be largely applied in Philadelphia for a long while to come unless the Legislature extends the General Corporation law so as to authorize companies to furnish that kind of power; but such extension will be of no avail if the company to furnish the power is hampered by the condition that its customer shall charge no more than five cents per passenger, whether carried one mile or seven. The power company will simply not be formed under such restrictions, and the main purpose of the legislation will be defeated. A general law of the kind proposed is not the place for such details. The authority should be granted pure and simple. That is the business view of the matter.—*Public Ledger, Phila., May 23.*

List of Recent Patents for Inventions Relating to Tramways.

- 277,564. Guard for Street-Cars: Robert J. Good, Terre Haute, Ind. Filed July 14, 1882.
 277,793. Sash-Holder for Street-Car Windows: I. N. Walter Sherman, Des Plaines, Ill. Filed Dec. 9, 1882.
 278,031. Stone Pavement: Andrew McKinley, St. Louis, Mo. Filed Jan. 16, 1883.
 278,044. Wire-Rope Railway: William S. Ray, San Francisco, Cal. Filed May 6, 1881.

The Pike's Peak Railroad.


A TRAMWAY is to be built up Pike's Peak, which will overshadow the Mount Washington railway. The plan is to construct three of these tramways, each nearly three miles long, one beginning at the end of the other. The first will start from the rear of the iron spring at the Manitou, and the last will be terminable in front of the signal station on Pike's Peak, at an elevation of 14,200 feet. The supports will be made of trees not less than eight inches in diameter, and about twenty-four feet high, braced above and below. On these an endless wire cable of one inch diameter will revolve, and upon which will be fastened, at intervals of about 100 feet each, a large covered arm chair, in which two persons can comfortably sit. This will be suspended about eight feet from the ground, and pass at entering and discharging points along a movable platform to load and unload without stopping. The lower section will be propelled by an engine at the lower end. The center one will be driven by water power, utilized on the mountain side through a turbine wheel, and the third by an engine erected on the summit of the peak.

Compressed Air as a Motor.

IN connection with new motors for street railway purposes an interesting report comes from London of a successful trial of a tram-car worked by compressed air upon the system of M. Mekarski, of Paris. The test was made on the tracks of the London Streets Tramway Company, which extend a distance of two miles. In appearance, the car is described as differing very slightly from the ordinary street car. With the exception of two small jar-shaped vessels on the front platform there is nothing in the way of machinery visible. By the means of pumps the air is passed into reservoirs, from which the tanks under the car are charged to the necessary pressure. It is claimed that under favorable conditions the car can run a distance of ten miles without recharging. The experiments were made with forty persons on board, and there was but one opinion as to the smoothness and ease of working, and the thorough control over the regulation of speed as well as over the starts and stoppages.

Planking for Railroad Crossings, Etc.

MR. S. T. WILLIAMS, of Red Bank, New Jersey, has introduced and is supplying an improved planking specially adapted for railroad crossings, flooring for stations and freight houses, and, in

short, for all places in which there is a great amount of heavy trucking. His improvement is an economical one, costing no more than ordinary planking with the addition of the value of the iron used in it. The flooring or planking is made of any thickness required. To prepare the planking to receive the T iron, it is run through a planer, set to make a groove on each edge of it, at a suitable distance from the top, and so as to receive the lower handles of the T iron, which is reversed thus  so that its center portion comes up even with the upper edge of the planking. The iron answers several purposes: it prevents the planking from being cut into by heavy trucks, gives a good foothold to the horses, stiffens the flooring, keeps the planking even and greatly increases its durability.

Mr. Williams gives prompt attention to all inquiries concerning his valuable improvement.

ANOTHER electric railway is building in Germany. It will connect Frankfort-on-the-Main with Offenbach, eight miles away, and the dynamos will be driven by steam engines stationed at a village half way between the termini.

THE Market Street Passenger Railway Company announces its intention of entering into a contract for laying the cable road as soon as the Mayor signs the ordinance. It is understood he favors the new system.

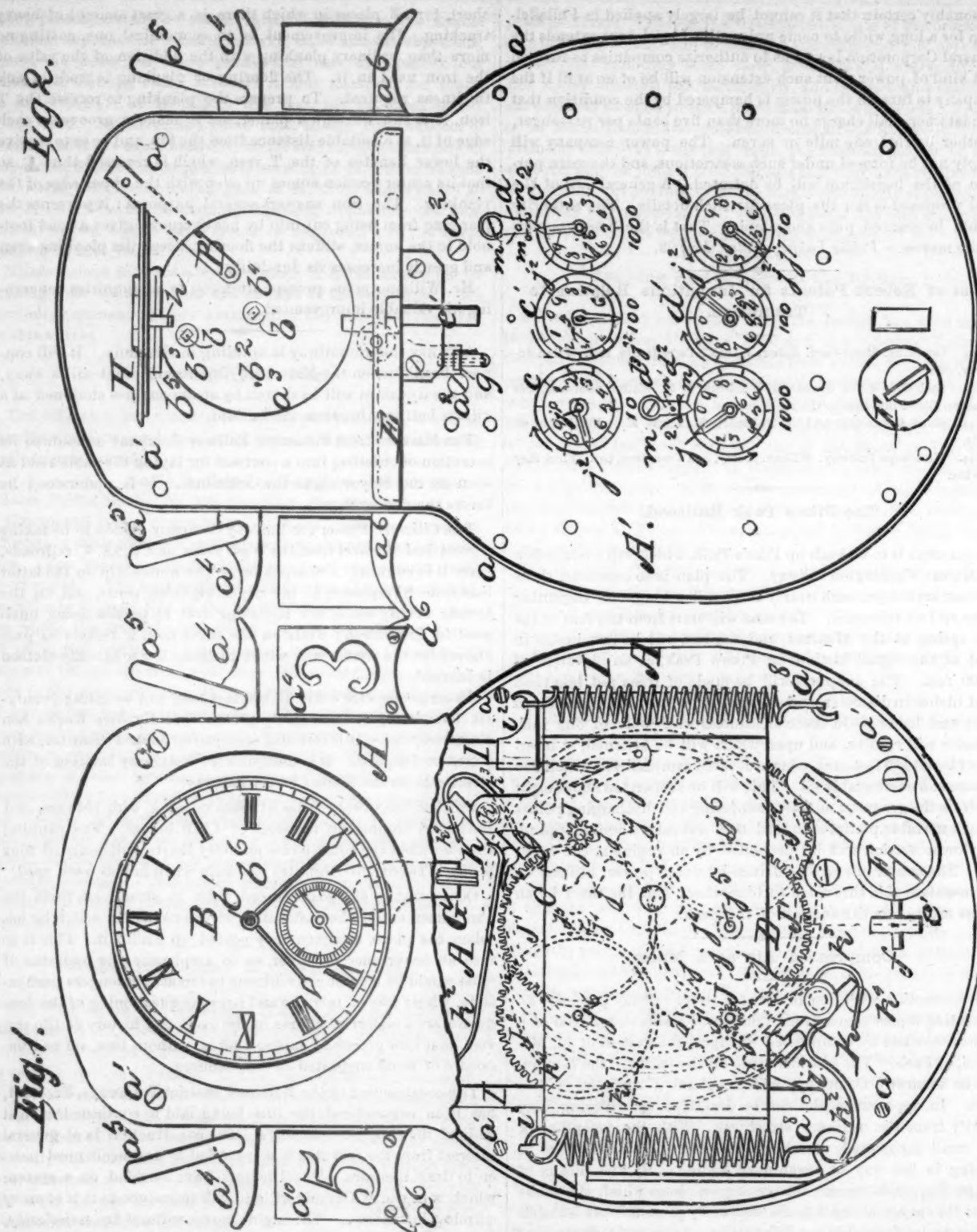
THE Citizens' Passenger Railway Company is said to be taking a great deal of travel from the West Penn. and the A. V. railroads, since it is running to Sharpsburg. The round trip on the latter line from Sharpsburg to the city is eighteen cents, and on the former twenty cents, not including toll, by parties doing business in Pittsburgh; while on the street cars, gives a good foothold to the horses, stiffens the flooring, keeps the planking even and greatly increases its durability.

AN immense wire cable, 10,000 feet long and weighing twenty-six tons, has just been made at the Hallidie Wire Works, San Francisco, Cal. It is one and one-quarter inches diameter, with a center of manila. It is designed for stationary traction of the street cars on the Market Street Railway.

CHICAGO has twenty miles of cable railroad, with 174 cars, and the steam engines do the work of 1,970 horses. The running time between the court house and city limits, a distance of four miles, is twenty-five minutes less than when horses were used.

OCCASIONALLY the experienced rider in street cars finds the announcement of the destination of the vehicle in which he has taken his place, conspicuously posted up within it. This is so rare an occurrence, however, as to emphasize the omission of what would be a great convenience to female passengers particularly, whose fear of mistake and nervous questioning of the conductor are a matter of course in the every-day history of the service as it now generally exists; that is, without that aid to composure of mind suggested in the premises.

THE construction of the Norwood District Tramways, England, has been commenced, the line being laid to continue the dead ends of the Croydon tramways. The construction is of general interest from the fact that it is intended to use mechanical power to draw the cars. The directors have decided on a system which is in use at Dusseldorf, and will introduce to this country a fireless locomotive. The engine moves without fire, noiselessly, and without smell. There is no fire-box, no escape of steam, and no sulphurous fumes to contend with. The steam is generated in a stationary boiler, and charged into the locomotive reservoir at a pressure of fifteen atmospheres, passing through water into this reservoir, the whole being superheated. The storage of heat is sufficient to give the power necessary to drive the engine for ten miles, which will be ample for the requirements of the new line. The engine can be driven up a gradient of one in twelve and a half, with nine tons behind it, with ease. The Norwood lines have several short and steep grades, so that it is expected every requirement will be met by the Dusseldorf system.



RICHARDSON'S ALARM FARE REGISTER.

Alarm Fare-Register.

WILLIAM J. RICHARDSON, OF BROOKLYN, N. Y., INVENTOR.

The foregoing sketches, being full size views, clearly show the latest patented invention for the registering and accounting of fares by conductors on street railroads or tramways.

Figure 1 is a front view, the cover below the watch being broken away in order to exhibit the interior parts. Fig. 2 is a rear

view, showing the cover in rear of the watch, and the cover of the registering-dials open in order to exhibit to view the parts covered thereby.

The inventor is the Secretary and Treasurer of the American Street-Railway Association. Since the organization of the Atlantic Avenue Railroad Company of Brooklyn, eleven years ago, he has been Secretary of the Company, and has had under his especial supervision the examination of conductors' returns and the means used for the detection of dishonest employes.

The Atlantic Avenue Railroad Company has adopted this alarm-register as its standard. The registers have been in course of construction for some time past, and as soon as completed will be placed on its lines. This company was the first east of Buffalo to adopt the bell-punch in 1872, and has continued its use uninterruptedly ever since.

It has been a matter of serious question on the part of railroad managers as to whether they should oblige a conductor to use a stationary register in a car, which might be tampered with in the conductor's absence, by persons maliciously inclined.

This apparent unfairness as between man and man has very reasonably had weight when the question of the adoption of stationary registers has been considered. In case of a fire on the line of a road, with several lines of hose stretched across the tracks, and the consequent transferring of passengers from one car to another, there must of necessity be great embarrassment, even to the extent of neutralizing, for the time being, the good results endeavored to be obtained by the use of this form of check on the conductor's returns.

When the conductor is furnished with a portable fare-register, as it is carried by him, it cannot be tampered with, while his accounts in case of a fire on the road can be kept perfectly correct at all times.

The main objection heretofore to portable registers, has arisen from the fact that the alarm-bell has been so small that it has been possible for "dummy-bells" to be secreted either in the hand or about the clothing of the conductor, so that by its use the passenger and counter have been deceived and the company mulcted.

In the above register, or rather that which is in course of construction, and for which an additional patent is ready to be issued, the bell for announcing the collection of an adult fare is three inches in diameter, and sounds almost as loud as the largest stationary register-bell. The fare is registered immediately before the bell is rung, and before it is possible for the bell to be rung.

As all children under twelve years of age are carried inside the car and never on the platforms, a much smaller bell is used in connection with half-fares. This bell, however, is one and-a-half inches in diameter, and is as large as the bell used in the "bell-punch."

Any one who has had intimately to do with time inspection, knows how difficult it is to find a conductor with a watch that is worth carrying. All roads require conductors to have watches. These watches are oftentimes as useless for the purpose for which watches are made, as was the countryman's turnip. If running, they are unreliable; and if not, they have just "run down," "broken," or are "at the watchmaker's getting fixed," when the time-inspector would compare their time with his own "chronometer." The average conductor is generally too poor to buy a good watch, and obeys the "letter of the law," in carrying the semblance of a watch. The importance to horseflesh of having cars run on time cannot be over estimated. The curse of "loafing" goes hand in hand with "knocking-down."

In this register, the watch-movement is a superior Waltham, carrying standard time, and is so completely enclosed in a case that it can be wound and set in the company's office only. A heavy crystal covers the dial. Under no circumstance can the conductor get at the movement to interfere with it.

The purpose of the watch, however, is two-fold. The register is suspended on a line with the passenger's vision, and as the time of day is always a novelty, the passenger's attention will be invariably attracted to the watch. If the passenger carries a watch, he will be interested in comparing it with the standard time carried by the conductor; if he does not carry a watch, he will be interested in knowing the exact time of day. In this way the passenger's attention will always be called to the register, and he will see whether the conductor manipulates the vertical arm of the register in recording the fare collected.

The company is not only benefited by having the conductor and passenger furnished with the correct time, by which the former is enabled to run his car on time and the passenger to see to it that he does so, but the company is also benefited by having the passenger's attention called directly to the fact as to whether the conductor rings the alarm upon the collection of his fare.

The registers are what are known as gas-meter registers of the simplest construction. The dials can be shown to the conductor or not, as may be preferred. The inventor's belief, however, is that they should be concealed from both conductor and counter, in order that the best work may be obtained from both.

Under all the systems which tell a conductor just how many fares he has recorded on a half trip, he is relieved from counting his money to see whether he has made an error or not, and it is the invariable rule that conductors do not count their money for such a purpose when provided with such registers.

The old-fashioned way of obliging the conductor to deduct the amount of his working money on each half trip from the total amount of money in his possession, and the computation of the number of fares collected, will decrease the conductor's facilities and opportunities to pilfer, should he be so inclined, correspondingly enhance the company's receipts, and will beyond peradventure secure better results from those employed to detect dishonest men.

The registers are set daily in a moment, at zero, and the dial-hands cannot pass beyond 1,000 (which, of course, is the extreme limit required for a day's use), so that there can be no tampering with the mechanism without immediate detection.

As this register is suspended from the conductor's neck, thus leaving both hands free, it requires only one hand to ring it. The advantage afforded the conductor by the use of such a register, over those that are either obliged to be carried in the hand or must be manipulated by both hands, as is the case with the "bell-punch" and its accompanying trip-slips, is apparent.

The case of this instrument is struck-up of what is known as malleable alloy nickel, so as to insure lightness. The wheels and levers are all made of hardened steel, and the instrument is made in all its parts in the best possible manner.

The register has been made with a view of meeting the wants of all street railroads, the defects of other registers having been overcome. In a word, it is as nearly perfect as ingenuity and mechanical skill can make it for the purpose of checking the collection of fares, and thus securing honest returns to the companies.

We congratulate Mr. L. H. Nutting upon his appointment as passenger agent for New York City and vicinity, for the Missouri Pacific Railway Company, and the Wabash, St. Louis and Pacific Railway Company. His headquarters are at No. 243 Broadway, where he is doing a splendid business for these great corporations, which offer excellent inducements to travelers. The general eastern agent for the same companies is Mr. H. B. McClellan, whose office is at the same address. He has charge of all passenger business in the New England States, and the States of New York, New Jersey, Maryland, Delaware, District of Columbia, the State of Pennsylvania (except the city of Pittsburgh), and Richmond, Virginia. Mr. McClellan's promotion from his duties in the freight department has been well earned.

ITALY is the most malarious country in the civilized world. Of the sixty-nine provinces of the kingdom only six are nominally free from what is known as miasmatic or Roman fever, and in twenty-one the scourge assumes really serious proportions. Every year no fewer than 40,000 men in the army are attacked by the disease, and it is calculated that the prevalence of malaria necessitates the annual expenditure by the Government of something like ten million lire for the maintenance of special hospitals for public servants. It has been found that the extension of the railway system throughout the peninsula has increased the evil. The turning up of fresh damp earth, and the unavoidable formation of new banks, deep cuttings, and excavations which speedily fill with water, breed the disease in its worst forms. On one of the railway lines which runs through much marsh land, the annual rate of mortality among the employes is thirty-six per 1,000.

On the Lack of Vertical Stiffness in the Tram Rail.

To any one who has given the subject of tramway construction much thought, one point must attract immediate attention, viz.: the radical difference that governs its principles of construction as compared with those that govern steam railroad construction, which for brevity we will hereafter term merely railroad construction.

That there should exist some difference, even a considerable difference, is inevitable; but the difference that does exist is so great that a comparison of the two systems seems almost impossible in a single detail of construction. When it is remembered that the present railroad system is the outcome of a system so nearly identical with the present tramway system that it may be truly called the same, this great difference must necessarily attract attention.

The question occurs, why should the system found wanting in the one case be still faithfully adhered to in the other? Did it fill all the requirements of the latter, the question would be superfluous; but the short life of the present tramway where, comparatively speaking, light loads and slow speeds are the rule, is *prima facie* evidence that it does not fill those requirements, to say nothing of the almost universal acknowledgment that it is defective, on the part of those who have invested in the tramway.

I think a slight analysis of the difference between the two systems will teach us wherein the latter system is lacking, and I propose trying to show that it is principally due to the lack of vertical stiffness in the rail.

The subject may be considered from three points of view:

1. The foundation or sub-stratum.
2. The connection between same and the rail; and
3. The rail itself.

In the first, the tramway is not lacking. In both systems the considerations involved are very similar and differ in degree only. In both it is a question of weight or superincumbent traffic and speed of same. In the railroad, we may safely take a weight of say thirty-five tons, distributed over nine cross-ties, or say seventy-two square feet as a heavy average. In the tramway, we may take say six tons, distributed over the wheel base, as a comparison. Disregarding the support of that part of the system not directly supporting the weight, which is an assumption that puts the burden of the comparison upon the tramway, we would have six tons sustained by twenty feet. In the former case, a rough comparison of half a ton per square foot, against a third of a ton per square foot in the latter case. Apart from the consideration of weight exists the fact, that the necessities of street traffic have previously, in the case of the tramway, enforced the existence of an admirable foundation, surface drained and generally rendered compact from previous use. We cannot look to the foundation of the tramway for the deficiency.

A comparison on the second point, viz.: the connection between the rail and foundation, brings forward the main difference between the two systems. The railroad has only to provide for its own traffic, the tramway for the street traffic as well. Therefore the former system has been able to disregard all but its own purposes. The rail can be entirely exposed, and hence the connection is most simple. It consists of cross-ties laid at short intervals, to which the rails are connected by spikes, their own continuity being secured and expansion provided for by the fish-plate joint. The tramway, however, has to preserve a connection with the road-bed which will sustain a cross traffic as well as a parallel traffic, independently of its own cars. Hence, we find the cross-ties (placed further apart than in the railroad system) are reinforced by longitudinal stringers of sufficient depth to present a contact surface to the road-bed vertically, as well as horizontally. The form of rail used is very generally that of the type illustrated below.

The vertical height of a 45 lb. rail (i. e., 45 pounds to the yard) is about 1½ inches only, hence it is alone incapable of sustaining the lateral strain of cross traffic. The form of stringer used presents only a vertical and horizontal surface to the road-bed, and as the surface of the road-bed becomes quickly worn, and in many cities is much neglected, the upper part of the stringer is not adequately supported. Consequently, this cross traffic exposes this system to a torsion as well as direct strain. This is generally met by securing a greater depth than would be otherwise necessary, and further supporting the stringer by metal knees or braces. I think these defects can properly be charged only to the small depths of the rail, and consequent lack of vertical stiffness.

Dealing with the last point, viz.: the rail itself, the matter is virtually but a continuation of the preceding considerations. In the railroad system, the use of steam at an early stage of its existence rendered it necessary to support heavier weights at greater speeds. This so emphasized the need of greater stiffness in the rail that the problem was at once grappled with. In both systems the evil was common. If the orthodox would permit such a comparative use of the term, we might say that in the railroad system the evil quickly became active, whereas in the tramway system the evil has remained passive, and yet none the less costly for that.

In the tramway system, the composite rail (i. e., the rail and stringer combined) does not lack in vertical stiffness, though as

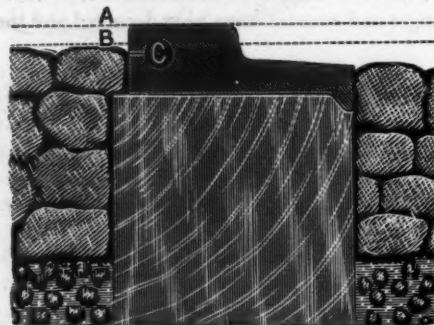


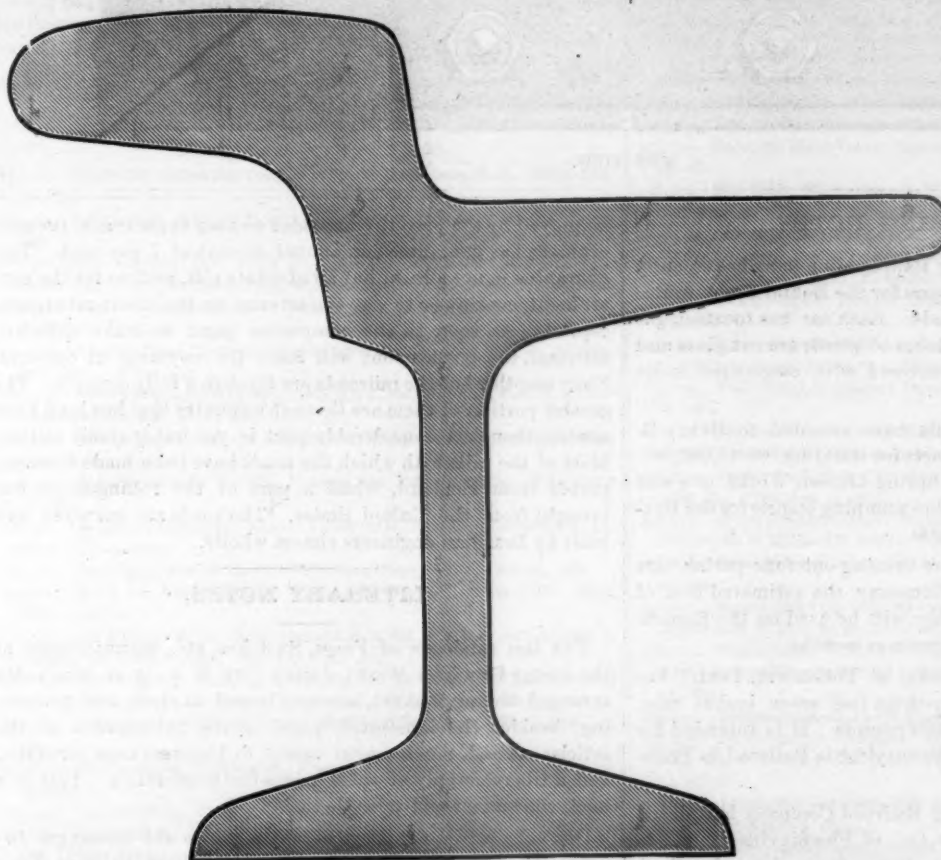
FIG. 1.

already indicated the system is only composite because the rail proper does so.

We have shown that the composite structure enforces a bulk and depth that renders the excavations excessive and the construction costly; and we can further show that its composite nature is incompatible with durability, and, indeed, forbids any approach to a smooth and perfect road. That timber as here used is not durable, is a foregone conclusion. The frequent and costly renewals of the stringers give ample evidence thereof. The nature of street traffic quickly wears the street here. The rail guides the wheels of the passing vehicles, and to a great extent holds them at this point. There is no bond between the stringer and the street, and as the wheels are running over what may be termed a dividing line, quick wear is inevitable. There is thus provided a series of receptacles for moisture during wet weather and for exposure during dry weather, that quickly rot and destroy the stringer. Another element of destruction exists in the expansion of the rail. The nature of construction is such that with a flat rail it cannot be provided for. The rail is attached to the stringer by spikes, with no room or play available. The strain of expansion and contraction is thus exerted on the timber, which yields. Again, a tram rail is exposed to the double traffic of the tram cars and street vehicles, the former using the head, the latter the flange. This pressure at different points soon loosens the rail, causes vibration and forbids stability or permanence. In fact from whatever point of view it is discussed the conclusion that a composite structure for this purpose is in-

consistent and totally wanting, seems forced upon us; and the composite system can only be replaced by a rail that has ample vertical stiffness.

In the efforts of the railroad system to secure a stiff rail, economy of material was not secured at once, as witness the old type of pear-shaped rail, followed later by the rail of massive web, still in use on many roads. To-day, however, the problem has received that amount of study which has so improved the design that there seems to be no valid reason why the tram rail cannot, at one bound, reach the desired vertical stiffness, combined with economy of material that is needed, by following the former. The rail illustrated below seems to have secured this object in a thorough manner. I append some tests thereof which are interesting, and as a guide, instructive.



TESTS FOR TRANSVERSE STRENGTH MADE AT CAMBRIA IRON CO.'S WORKS, JOHNSTOWN, PA., JUNE 7TH, 1883.

Supports 17 inches apart, Rails all of Steel.

1. Tram-rail weighing 45 lbs. per yard. Depth of head, 1½ inches. Width of do., 2 inches. Depth of flange, ⅞ inch. Width of do., 3 inches. Total width, 5 in. Elastic limit, 15,000 lbs. Ultimate strength, 32,000 lbs.

2. Test of same section of rail on a pine stringer 5 inches wide 9 inches deep.

At 20,000 lbs., timber much compressed, signs of yielding.

At 25,000 lbs., timber commenced to crack.

At 27,000 lbs., timber gave way, the two ends thereof were compressed ¾ inch, having reduced the width to 3½ inches.

3. Test of Johnson rail here illustrated weighing 52 lbs. per yard.

Elastic limit, 80,000 lbs.

Ultimate strength not reached by machine.

At 122,000 lbs., the permanent deflection was ¼ inch in 17 inches.

4. Test of 50 lbs. Tee rail. Pennsylvania Railroad section.

Elastic limit not reached.

Ultimate strength 122,000 lbs.

As a further comparison, I append a test made some time since of a section of Tee rail, Pennsylvania Railroad standard, 67 lbs. per yard.

Elastic limit, 77,000 lbs.

Ultimate strength, 144,000 lbs.

5. A second test of the Johnson rail for elastic limit gave 75,000 lbs. On removing the strain, the permanent set was scarcely appreciable.

Criticising the rail illustrated herewith, it is seen that we have secured a section which for the same weight, is, to say the least of it, relatively as strong as the Tee rail. As the rail in its design approaches the form of a

Hodgkinson beam this great strength might be looked for. The tests indicate a *greater* strength, but in the absence of carbon tests they cannot be absolutely compared. Taking the elastic limits which are the exponents of the real value of the rail, we have for the 45 lb. tram-rail a strength of 15,000 lbs., and for the 52 lb. Johnson rail a minimum strength of 75,000 lbs. That is to say, the strength of the Johnson as compared with the tram, is 5 to 1. It is further a matter of interest to note, that what I have termed a composite rail in this article, is only about ⅓ of the strength of the Johnson rail. The great stiffness of the new type of rail illustrated herewith can be taken advantage of by putting the cross-ties further apart and thus reducing the cost of construction. A rail of this type when laid, is there till worn out, and must effect a lasting economy in repairs and renewal of stringers. The joint is effected as in the steam rail by the use of the fish-plate as illustrated below, and secures a true and level track.

It is worthy of note that a rail of this general type has long been in use in England. There is a difference, however, in the use of the two systems, and consequently in the proportion and general design of the rail. In England the rail is not depended upon as an aid to street traffic; on the contrary, it must be of such form and width that it does not obtrude above the road-bed or uselessly monopolize room therein. Here the rail is a valuable adjunct to the street, and an extreme width is generally enforced by municipal law. Here the width of head runs from four to five inches. There it seldom exceeds three and one-half inches (see list below of various designs, taken from the treatise of D. K. Clarke).

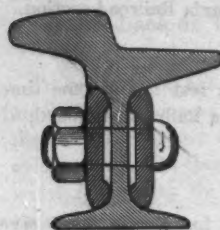
Bristol tramways, width of head 3½ inches.

Wirral tramways, width of head 4 inches.

Barker's system, width of head 3 inches.

Liverpool tramways, width of head 3½ inches.

It is seldom that the English rails reach a width of four inches. It is seldom that the rails in the American system are less than four inches, whereas to-day the majority reach a width of five



END VIEW.

inches. The extra width of the American rail permits of a bond with the street wanting in the English system, and moreover for the same height gives a greater vertical stiffness. It is really the case that from an engineer's standpoint, the failing, if we may so say, of the rail here illustrated, is an excess of vertical stiffness. That is to say, that a rail less stiff would answer, and

the present type might be lightened. But another consideration forbids this. We have emphasized the need of a bond with the street. To secure this, the side pockets must be sufficiently capacious, and the size of these pockets is governed entirely by the height, as the other dimensions of the rail are governed by considerations that do not permit of change. Indeed, it is hard to conceive of a strain, direct, transverse or torsional, exerted upon the rail which is the subject of this article, without its being thoroughly resisted by the street itself should the rail be disposed to give. That it is not likely so to do, the tests here given indicate.



SIDE VIEW.

MANUFACTURING NOTES.

THE Philadelphia and Reading Railroad Company has recently completed en handsome parlor cars for the Bound Brook route. They are all made with round ends. Each car has fourteen gas chandeliers and pendants, the globes of which are cut glass and imported. The platforms are covered with corrugated india rubber.

THE Philadelphia City Councils have awarded to Henry R. Worthington of New York, contracts for building two 15,000,000-gallon pumping engines for the Spring Garden Works, at a cost of \$81,000, and one 7,500,000-gallon pumping engine for the Boxborough Works, at a cost of \$36,000.

THE Swissvale Car Company are turning out four parlor cars for the Pennsylvania Railroad Company, the estimated cost of which will be about \$60,000. They will be used on the Eastern Division of the road during the summer months.

THE Philadelphia Bridge Works, at Pottstown, Penn., has just completed a girder seventy-three feet seven inches long, and six feet high, weighing 40,020 pounds. It is intended for the Broad street crossing of the Pennsylvania Railroad in Philadelphia.

THE Philadelphia and Reading Railroad Company has placed a contract with Clarke, Reeves & Co., of Phoenixville, Penn., to build a double-track iron bridge, with a span of one hundred feet, over the canal at Phoenixville.

A PAPER steamboat has been built at Lansingburgh, N. Y., for a Pittsburgh company. Its length is twenty feet. It has seating capacity for twenty-five persons, and a carrying capacity of thirty tons. The sheathing is a solid body of paper three-eighths of an inch thick. A bullet from a revolver fired at the sheathing from a distance of only four feet, neither penetrated nor abraded it.

Railroads in Brazil.

FROM the report of United States Consul Andrews we learn that the Government of Brazil owns and administers several lines of railroad, and as a rule guarantees an income of 7 per cent on the necessary capital invested in the construction of private roads. The number of miles of railroad owned and in operation by the government is 800; and it also has nearly the same number of miles of railroad in course of construction, and which probably will be finished in six or eight months. The number of miles of private railroads in operation is 1,600, and in course of construction 1,400. On the capital of \$34,000,000

employed by the private companies owning these roads, the government has guaranteed an annual income of 7 per cent. This guarantee is not a loan, but an absolute gift, and so far the government continues to pay the interest on the above mentioned capital. As soon as the companies begin to make sufficient earnings, the government will cease the payment of interest. Fully one-third of the railroads are through a hilly country. The greater portion of them are through a country that has long been settled, though a considerable part is yet but sparsely settled. Most of the rails with which the roads have been made were imported from England, while a part of the rolling-stock was brought from the United States. The roads are surveyed and built by Brazilian engineers almost wholly.

LITERARY NOTES.

THE last catalogue of Frogs, Switches, etc., manufactured at the Jersey City Iron Works, Jersey City, N. J., is an admirably arranged oblong manual, strongly bound in cloth, and containing, besides the illustrated pages giving information of the articles named, much matter useful to business men generally, and a liberal supply of ruled pages for memoranda. This is a neat, convenient and valuable little book.

OUR acknowledgments are hereby made to the Passenger Department of the Detroit, Lansing and Northern Railroad, for a copy of the pamphlet entitled, "Detroit and the Pleasure Resorts of Northern Michigan." This consists of nearly ninety octavo pages of illustrated descriptive matter judiciously arranged with business announcements, bound in a handsome wrapper, and constituting a work which the recipient must value for its pleasant qualities as well as for the information contained within its pages. The pamphlet records very remarkable progress in a great State, is an evidence of commendable enterprise in the corporation which publishes it and is full of reason, pictorial and other, why people should seek and certainly find summer sport and recreation among the much-varied and delightful resorts of Michigan.

IN Berlin, street cars do not, as in American cities, stop anywhere at the beck or whistle of persons desiring to take passage, but only at certain places along the line. The cars are comfortably furnished, but the driver is almost constantly ringing a big alarm bell, which is very annoying. Women skip on and off the cars in motion with all the grace and agility of a newsboy. They also share with the men the prerogative of riding on the platforms.

NEW INVENTIONS.

TO INVENTORS AND PATENTEES.

This department is devoted to the notice, consideration and description of new and valuable inventions applicable to Railroads, Steam Navigation, Machinery, Manufactures, Mining and Tramways. New patents of this description appearing in the weekly Official Gazette of the Patent Office are duly noticed in our columns, and full descriptions of those most useful and important are published *free of charge*.

Inventors, Patentees, and the holders of Patents are requested to forward us their claims and specifications, with description of their inventions for our examination with a view to their publication in this department. Descriptive cuts, diagrams, and illustrations of the same are also desired.

In selecting inventions for full description in this department, the editor will be guided solely by their importance and value, and their interest to the readers of the AMERICAN RAILROAD JOURNAL.

List of Patents for Inventions Relating to Railways, Tramways, Machinery, Etc.

BEARING DATE OF MAY 15, 1883.

- 277,460. Grain-Car Unloader: John H. Chase, Rochester, N. Y. Filed Oct. 25, 1882.
- 277,464. Lubricator: Warren H. Craig, Lawrence, Mass. Filed March 12, 1883.
- 277,466. Car-Coupling: Levi Davis, Jr., Alton, Ill. Filed Dec. 26, 1882.
- 277,476. Car-Brake: Philip R. Frey, Western Union, Wis. Filed Oct. 25, 1882.
- 277,490. Wheel-Guard for Railway-Cars: Joseph Jacobs, San Francisco, Cal. Filed Feb. 24, 1883.
- 277,536. Electric Head-Light for Locomotives, etc.: Flamen Ball, Jr., Cincinnati, Ohio. Filed Aug. 2, 1882.
- 277,539. Switch-Stand for Railways: Edward J. Beard and Howard V. Hinckley, Topeka, Kans. Filed Jan. 31, 1883.
- 277,546. Safety Car-Heater and Ventilator: William F. Condon, East Saginaw, Mich. Filed April 9, 1883.
- 277,552. Railway-Switch: Thomas J. Daly, San Francisco, Cal. Filed June 26, 1882.
- 277,569. Railway Telegraphic Signal: Rudolph M. Hunter, Philadelphia, Pa. Filed Oct. 16, 1882.
- 277,587. Car-Brake: Joseph Lytle, Cincinnati, Ohio. Filed April 19, 1882.
- 277,597. Spike for Railroad-Rails: William J. Morden, Chicago, Ill. Filed Aug. 25, 1882.
- 277,626. Car-Heater: Robt. Steel, Philadelphia, Pa., assignor of one-half to Charles Mace, same place. Filed Dec. 21, 1882.
- 277,635. Car-Coupling: William R. Wallace, Mount Vernon, Ill., assignor of two-thirds to Thomas L. Rivers, same place. Filed Nov. 3, 1882.
- 277,647. Brake-Shoe: William White, McMinnville, Tenn. Filed Feb. 16, 1883.
- 277,674. Car-Coupling: Edward R. Brown, Spartanburg, S. C. Filed Sept. 16, 1882.
- 277,677. Car-Coupling: Thomas F. Byron, Lowell, Mass. Filed Dec. 16, 1882.
- 277,684. Split Switch: John H. Crowley and Bernard M. Temple, Galveston, Tex. Filed April 17, 1883.
- 277,697. Railroad-Switch: Jacob Elmer, Biloxi, Miss. Filed Nov. 8, 1882.
- 277,698. Car-Coupling: Wheeler Willard Fitch, Honeoye Falls, N. Y. Filed Feb. 26, 1883.
- 277,701. Car-Coupling: Joseph C. Fowler, Galveston, assignor of one-half to Sinclair Taliaferro, Houston, Tex. Filed March 20, 1883.
- 277,723. Car-Coupling: John Heffner, Hopewell Township, and William Kelly, Liberty Township, Bedford County, Pa. Filed March 24, 1883.
- 277,735. Nut-Lock: William M. Irvine and John J. Waddill, Montgomery, Ala. Filed April 7, 1883.
- 277,745. Station-Indicator: Henry Koehler, Pomeroy, Ohio. Filed Nov. 27, 1882.
- 277,765. Tubular Railway-Rail: Almeron McKenney, Chicago, Ill. Filed Sept. 25, 1882.
- 277,766. Railway-Rail: Almeron McKenney, Chicago, Ill. Filed March 11, 1881. Renewed Oct. 9, 1882.
- 277,773. Car-Coupling: Thomas B. Nutting, Morristown, N. J. Filed Feb. 14, 1883.
- 277,783. Suspension Railroad-Car: Daniel Query, Atkinsonville, Ind. Filed Jan. 17, 1883.
- 277,810. Railway-Car: Thomas L. Wilson, Port Hope, Ontario, assignor of one-half to Samuel Davis, Montreal, Quebec, Canada. Filed Feb. 15, 1883.
- 277,823. Car-Coupling: Noah B. Zimmerman, Elizabeth City, N. C. Filed March 8, 1883.
- 277,825. Car-Axle: Henry C. Atkinson, Franklin, Ky., assignor of a part to T. B. McKenzie & Harris, Jodie Black, John G. Harris, R. B. Phillips, G. S. Black, L. J. Jones, and I. H. & T. M. Goodknight. Filed Jan. 30, 1883.
- 277,828. Car-Coupling: Nicholas Barr, Cayuta, N. Y. Filed Feb. 21, 1883.
- 277,837. Car-Coupling: Alfred Fulton, Chicago, Ill., assignor of one-third to Peter Peterson, same place. Filed Aug. 4, 1882.
- 277,854. Safety-Casing for Railway-Car Stoves. Benjamin D. Stevens, Burlington, Vt. Filed Dec. 18, 1882.

BEARING DATE MAY 22, 1883.

- 277,897. Steam-Engine: Henry Hartig, Brooklyn, N. Y. Filed Oct. 7, 1882.
- 277,903. Car-Ventilator: Owen H. Jones, Hartford, Conn. Filed May 11, 1882.
- 277,915. Car-Coupling: William J. McLean, Jackson, La. Filed March 29, 1883.
- 277,918. Car-Coupling: Susan P. Moulton, Salem, Mass. Filed March 7, 1883.
- 277,921. Spike: James T. Nulty, Philadelphia, Pa. Filed July 20, 1882.
- 277,983. Governor Cut-Off-Valve Gear: Isaac W. Bragg, Kidder, Mo. Filed Aug. 11, 1882.
- 277,990. Electric Train-Arrester: Harry W. Carlton, Peoria, Ill. Filed Dec. 6, 1882.
- 277,994. Locomotive: William E. Cole, Montgomery, Ala. Filed March 15, 1883.
- 278,007. Buffer: Robert P. Garsed, Norristown, Pa. Filed March 18, 1882.
- 278,014. Car-Coupling: Louis Herrman and John B. Lavin, Boston, Mass., assignors to themselves and Louis Joseph Herrman. Filed March 29, 1883.
- 278,016. Railway-Track Joint: Julius H. Holmgreen, Muskegon, Mich., assignor to himself and Robert Bloss, same place. Filed Oct. 18, 1882.
- 278,020. Balanced Slide-Valve: Samuel E. Jarvis, Lansing, Mich. Filed Dec. 13, 1882.
- 278,032. Nut-Lock: Michaelangelo W. Meagher, New York, N. Y., and James C. Anderson, Winnipeg, Manitoba, Canada. Filed April 13, 1883.
- 278,048. Car-Axle and Box: Levi H. Roberts, Paris, Ill. Filed March 21, 1883.
- 278,058. Balanced Valve: Edward Stewart, Battle Creek, assignor of one-half to Richard W. Lonsbery, Richland, Mich. Filed Jan. 26, 1883.
- 278,062. Steam-Engine: Eduard Tandler, Grand Rapids, Mich. Filed Feb. 26, 1883.
- 278,092. Freight-Car-Door Fastening: William J. Carey, Millvale, assignor of one-half to Henry P. Staving, Allegheny, Pa. Filed March 19, 1883.
- 278,112. Feed-Water Regulator: David Edwards, New York, N. Y. Filed April 12, 1883.
- 278,133. Duplex Direct-Acting Engine: William H. Guild, Brooklyn, N. Y., assignor to Guild & Garrison, same place. Filed March 29, 1883.
- 278,141. Device for Lighting the Steps of Cars, etc.: Geo. W. Hunt, Philadelphia, Pa. Filed Jan. 2, 1883.
- 278,164. Steam-Pressure Gage: Murdock McNeil, East Cambridge, assignor of one-fourth to Richard S. Smith, Boston, Mass. Filed Oct. 25, 1882.
- 278,196. Feed-Water Heater: Edwin R. Stilwell, Dayton, Ohio. Filed Feb. 24, 1883.
- 278,213. Signal-Light for Railway-Cars: Albert A. Bissell, Joliet, Ill., assignor of one-half to Edward R. Knowlton, same place. Filed Feb. 14, 1883.
- 278,223. Water-Gage: Willard A. Clark, Stillwater, Minn., assignor to the Northwestern Manufacturing and Car Company, same place. Filed March 13, 1883.
- 278,231. Railroad-Signal: David Frank, Allentown, Pa. Filed June 3, 1882.
- 278,235. Car-Coupling: William J. Gossett, Liberty, Tenn., assignor of one-half to J. J. Williams and S. D. Bass. Filed May 3, 1882. Renewed March 14, 1883.
- 278,236. Automatic Car-Stove-Fire Extinguisher: James F. Gyles, Chicago, Ill. Filed March 3, 1883.
- 278,242. Locomotive-Brake: Edward B. Leigh, St. Louis, Mo., assignor to the American Brake Company, same place. Filed March 6, 1883.
- 278,285. Refrigerator-Car: Daniel E. Somes, Washington, D. C. Filed Jan. 24, 1883.
- 278,292. Car-Truck: Ira C. Terry, St. Louis, Mo., assignor of one-half to Andrew Warren, same place. Filed March 16, 1883.
- 278,297. Railway Steam Car-Brake: Fred. B. Walker and James Lauder, Galveston, Tex. Filed Jan. 12, 1883.
- 278,299. Steam-Brake for Locomotives: William B. Wallace, Belleville, Ill. Filed Nov. 16, 1882.

BEARING DATE MAY 29, 1883.

- 278,309. Journal-Box Lubricator: Nela M. Bergqvist, Chicago, Ill. Filed Oct. 30, 1882.
- 278,328. Car-Buffer: Adolphe Gallinant, Roslyn, N. Y. Filed Feb. 28, 1883.
- 278,334. Car-Coupling: Hale E. Hawk, Kansas City, Mo. Filed Feb. 23, 1883.
- 278,343. Dumping-Car: Sidney D. King, Pittston, Pa. Filed March 27, 1883.
- 278,344. Railroad-Switch: James Leet and Alexander C. Israel, Kimmswick, Mo. Filed Nov. 8, 1882.
- 278,349. Harness-Saddle: Stephen A. Marker, Newark, N. J. Filed May 31, 1882.
- 278,377. Catch for Grain-Car Doors: Dennis F. Van Liew, Aurora, Ill. Filed Dec. 21, 1882.
- 278,378. Car-Starter: Ohas. P. Warnick, Chicago, Ill., assignor of one-half to Charles Jahnke, same place. Filed Feb. 24, 1883.
- 278,382. Steam Snow-Shovel: William A. Woods, Woodford's Corner, Me., assignor to himself and Louise A. Williams, Boston, Mass. Filed Oct. 26, 1882.

- 278,387. Ball-Governor for Steam-Engines: William E. Badger, Quincy, Mass. Filed March 29, 1883.
- 278,397. Air-Engine: Harvey H. Burritt, Newark, N. J. Filed March 21, 1883.
- 278,403. Car-Coupling: Newell P. Cowell, Cleveland, Ohio, assignor to the Cowell Platform and Coupling Company, same place. Filed Jan. 28, 1882.
- 278,404. Shaft-Hanger: Hilen C. Crowell, Erie, Pa. Filed Sept. 18, 1882.
- 278,428. Railroad-Spike: William Goldie, West Bay City, Mich. Filed Aug. 2, 1882.
- 278,429. Locomotive or Car-Brake: William B. Guernsey, Norwich, and William B. Turner, New York, N. Y., assignors of one-third to the Torrey Automatic Brake Company, of New York. Filed June 2, 1882.
- 278,440. Device for Blowing Locomotive-Whistles Automatically: Edwin A. Leland, Holyoke, Mass., assignor of three-fourths to Chas. P. Lyman and Hervey K. Hawes, both of same place. Filed July 3, 1882.
- 278,446. Hot-Air Engine: Thomas McDonough, Montclair, N. J. Filed Oct. 19, 1882.
- 278,451. Valve-Gear for Steam-Engines: Eugene O'Neill, San Francisco, Cal. Filed Feb. 27, 1883.
- 278,470. Locomotive: Edward A. Trapp, New York, N. Y. Filed Feb. 16, 1883.
- 278,478. Device for Dressing Valve-Seats of Globe-Valves: Pliny J. Wright and Samuel Rust, South Hadley Falls, Mass. Filed Feb. 24, 1883.
- 278,488. Hygrometric Governor for Railway-Heads: George A. Ayers, Holyoke, Mass. Filed Sept. 4, 1882.
- 278,489. Station-Indicator: Charles O. Ball, Lowell, Mass. Filed Dec. 2, 1882.
- 278,495. Car-Truck: Austin A. Brooks, Eau Claire, Wis., assignor of one-half to John A. Whitfield and Henry M. Wilcox, same place. Filed March 13, 1883.
- 278,496. Means for Utilizing the Waste Heat of Furnaces: William H. Brooks, New York, N. Y. Filed Feb. 21, 1883.
- 278,517. Rock-Drilling Apparatus: George McC. Derby, New York, N. Y. Filed Nov. 14, 1882.
- 278,533. Railway-Switch: John Gibbon, U. S. Army. Filed Dec. 15, 1882.
- 278,548. Railway-Switch: John L. Hill, Brooklyn, N. Y. Filed Sept. 6, 1882.
- 278,573. Car-Coupling: Charlie E. Mark, Flint, Mich. Filed Jan. 15, 1883.
- 278,598. Car-Coupling: Jacob Rhule, Pittsburgh, Pa., assignor of one-half to John Herman Jantzen, same place. Filed Jan. 24, 1883.
- 278,602. Reflector and Signal Frame for Car-Lamps: Henry Roth, New York, N. Y., assignor to Annie Roth, same place. Filed Jan. 31, 1883.
- 278,605. Car-Coupling: Charles H. Schaaff, Alexandria, Va. Filed Feb. 24, 1883.
- 278,606. Car-Buffer: John T. Schaffer, Rochester, N. Y. Filed March 30, 1883.
- 278,611. Car-Door and Fastening: Wm. P. Senour, Pimento, Ind. Filed March 14, 1883.
- 278,616. Car-Brake: Charles W. Smith, Colesburg, Mo. Filed March 6, 1883.
- 278,626. Car-Coupling Link: Frank Sweetland, Edwardsburg, Mich. Filed March 13, 1883.
- 278,628. Spike: William Taylor, Pittsburgh, Pa., assignor to the Angular Steel Nail Company, (Limited,) same place. Filed Jan. 19, 1883.
- 278,637. Steam-Boiler Furnace: Ezra W. Vanduzen, Newport, Ky. Filed Dec. 14, 1882.
- 278,648. Balanced Rotary Valve: Abiel E. Wilson, Worcester, Mass. Filed Feb. 28, 1883.

Chapman's Boiler Cleaner.

THE principle of operation in the Boiler Cleaner invented by Mr. G. A. CHAPMAN, of Strawberry Point, Clayton County, Ia., is to connect the top of the water with the bottom of the water in the boiler and wall, if there is any wall, through a mud-settling drum back to the bottom of the boiler, and, in cases when practicable, the surface pipe may extend inward and take on a funnel mouth. The mud drum must have a blow-off valve at the bottom, and for convenience a globe valve above and below the mud drum is desirable, so that the mud drum can be cleaned without emptying the boiler. The mode of operation is as follows: When the water begins to boil, currents are established upward and in the direction of the cooler parts of the boiler, and finding an outlet at or near the surface of the water, the water is forced out through the surface pipe into the mud drum, where the water is comparatively still, not being disturbed by boiling heat; and as the rising currents in the boiler draw upward, the water in the mud drum is drawn back into the boiler with considerable force. Hence a strong current is established through the pipe and mud drum, and as the sediment is carried into the drum by the current, it separates from the water by settling in the drum, where the water is still; and as all the water in the boiler in time must pass through the drum, the sediment is left

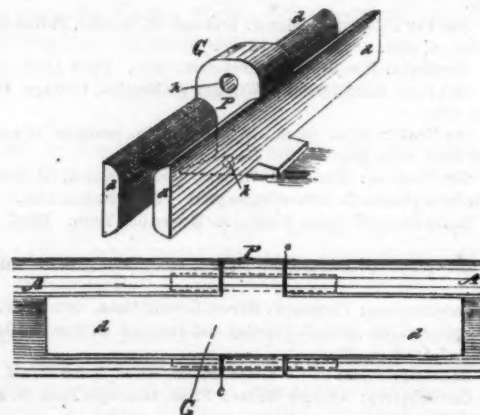
therein, when it may be blown off at leisure. Thus the boiler is kept free of sediment, and if any "scale" has been already formed, it will get weak and cleave off in a short time after the boiler has been put on, and be raked easily out of the hand-hole. When, the inventor claims, the boiler is once thus cleaned, there is no need of blowing off any more, for everything is kept clean without the necessity of doing this. Hence the durability of the boiler is increased, the bill for fuel reduced and the trouble and expense of cleaning the boiler saved.

The Trenear Coupling.

THE Car-Coupling invented by JOHN G. TRENEAR, of Huntington, W. Va., has two keys through the draw-head, one keeping the socket in place, and the other to keep the bolt rest from coming out too far. Provision is made to take the friction from the rest when moved by the spring, by the presence of a small wheel. The lip of the rest does not touch the bolt, which allows the spring to press the link against the bolt, and the curve in the rest keeps it in place while it enters the other draw-head and presses back the rest, and the bolt drops in place. The brakeman can stand on the top of the car and uncouple. The bolt cannot come out of place. When it is high enough, one of the keys before mentioned stops it and the rest is pressed out by the spring to hold it up, till in coupling it is pressed back again with the link, and the bolt falls into place.

Rail-Joint Fastener.

GEORGE F. HOEFFER, counsellor-at-law, San Francisco, formerly of Chicago, is the patentee of a rail-joint fastener which is claimed to make a continuous rail, thus obviating the necessity of repairs, seeing that the ends of the rails can never be "ham-



mered out" by the trains, and that thoroughfare, rails and fastener will wear out together and at the same time. More specifically, the object of Mr. Hoeffer's invention is to obtain such a construction and combination of the locker rods and rails that a junction may be accurately, quickly and durably effected without the aid of nuts, bolts, or screws. His device consists in the combination, with a four-armed perforated locker, of two face-bored rails, holding in said bores the ends of rods passing through the perforations of said locker. Its advantages, particularly stated, are, first, that the fastener secures an accurate, close and durable connection of the rails; second, that it does not interfere with either the contraction or the expansion of the rails; and, third, that the same is quickly attached, saving time, labor, and expense.

In the drawings, Figure 1 indicates vertical front or face end elevations of two rails, A A, each of which has two bores, b b, of sufficient diameter and depth to admit freely the ends of the respective rods shown in Fig. 2. Fig. 2 indicates two ordinary

rods, *c c*, made of wrought-iron, steel, or other suitable metal. Fig. 3 indicates the locker *G*, made of wrought-iron, steel, or other suitable metal, having four arms, *d d d d*, of desired length, and of shape and width so as to fit snugly into the recesses *n n* (see Fig. 1) of the rails. The locker with its four arms may be made in one piece, or, in anticipation of repairs to rails, the arms, *d d*, may be attached to *P*, the body of the locker, by means of a bolt or nut. But, as was intimated before, there is no need of this. The body *P* of the locker is in height equal to the height of the rail, and its extreme upper and lower parts conform in shape and size respectively, to those of the rails. Said body *P* has also two perforations, *h* and *k*, for the reception and passage of the rods *c c*, and are, when the rails are slipped into the arms of the locker, on a horizontal line with the bores *b b* in the face end of the rails. Fig. 4 indicates two rails joined by devices embodying my invention.

The fastener is constructed and the juncture of the rails is effected as follows: Having passed the rods *c c* into their respective perforations *h* and *k* of the locker, so that the ends of said rods project equidistant from both sides thereof, slip the rails into the arms *d d d d* of the locker up to the body *P*, passing the projecting ends of said rods into the bores *b b* of the rails. Then spike the locker and the rails to the ties.

If the rails are light weight, the dowel-pin may be dispensed with, and if of extraordinary weight or size, then the locker may be dispensed with and only the dowel-pins used. In ordinary rails the two are to be used in combination.

Car-Coupling.

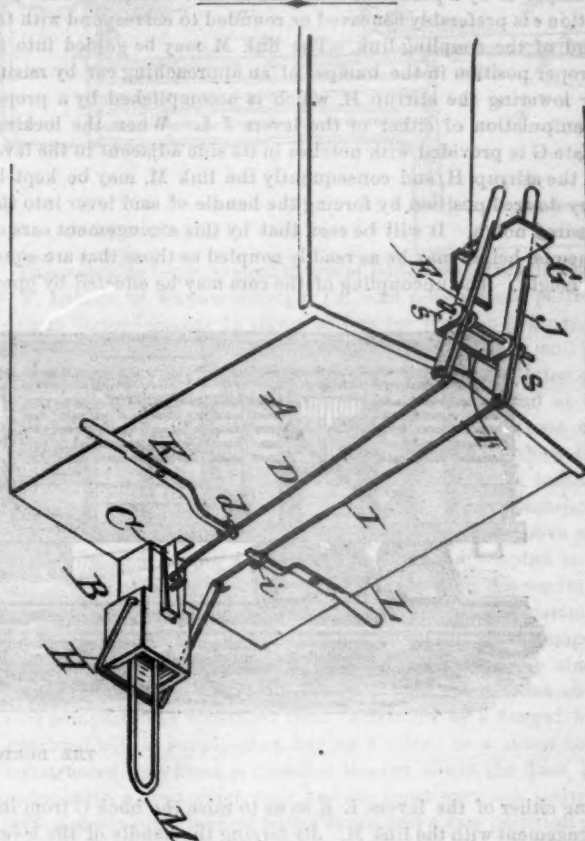
A NEW coupling, noticeable among the many being worried out by laborious brains, is that of CHARLES M. EZELL, of Baskinton, La. This invention relates to improvements in that class of automatic car-couplings in which a bail or link is pivoted to each draw-head or bumper, and which is adapted to be operated from either side of the ends of the car in such manner that the bail or link upon one draw-head may be brought down over a post or hook upon the opposite draw-head or bumper to connect two or more cars together; and the improvements consist essentially of a bail or link rigidly attached to and standing at right angles with a metallic bar or rod pivoted to the ends of a car, and provided with handles or levers at each side of the ends of the car, whereby the said bail or link may be readily brought down over a post or stud of peculiar construction upon each opposite draw-head or bumper.

The inventor claims that his is a most simple and effective coupling, one not liable to get out of order, which will readily allow of the car passing the most abrupt curves without liability of strain or injury to its several parts, and which also obviates the necessity of passing between cars to couple them.

Houghtaling's Car-Coupling.

LLEWELLYN A. HOUGHTALING's (Elmira, N. Y.) newly patented Car-Coupling is a very simple and cheap contrivance, and is commended by competent railroad men. It can be put on any draw-head now in use, requiring no outlay for new draw-heads. It works equally well on cars of different heights as on those of the same height. The device consists of a stirrup or bail hung to the draw-head in such a manner as to swing up over the under side of the draw-head, and thus lift the link any desired height. A prong or slide is projected from the under side of the stirrup for the approaching draw-head to strike against after the link has entered, and thus slide it down out of the way of being jammed by the approaching draw-head. A rod, with an arm in the center and one at each end, is placed under the end of the car, to be operated from either side by the short arm being thrown backwards or forwards. From the arm in the center of

the rod, or under the center of the car, is a connecting rod which connects by a peculiar open joint with the bail or stirrup hung to the draw-head. So, it can be very easily seen, by working the arm or lever at the side of the car, that the link is raised or lowered, and no danger of the brakemen being killed or crippled for life. In case the draw-head pulls out, as it often does, in such a case the stirrup or rod would be broken if it were not for the peculiar open joint already mentioned, which slips apart as soon as the draw-head pulls out, and can be slipped together again as the draw-head is put in.



The Hawkins Car-Coupling.

THIS is the invention of WILLIAM A. HAWKINS and CHARLES S. HAWKINS, of Waxahachie, Tex. It is patented.

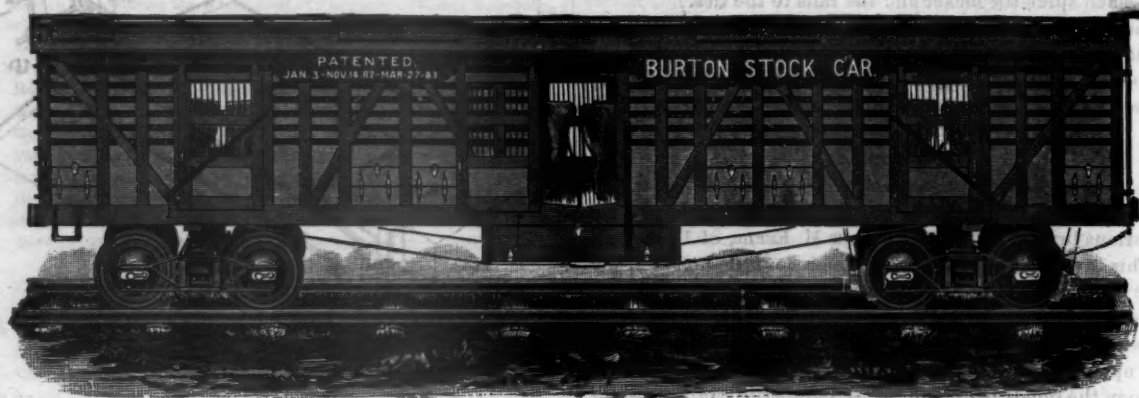
In the accompanying drawings, illustrating the invention, Figure 1 is a perspective view of a portion of a car with our devices attached to one end thereof; and Fig. 2 is a side elevation of the couplings, partly in section. Like letters indicate like parts. The letter *A* represents a car-body, to the lower side of one end of which a bumper, *B*, is attached in the usual manner. This bumper *B* is recessed, as shown in Fig. 2, and in this recess the coupling-hook *C* is pivoted. An ear, *c*, is formed on the upper side of the coupling-hook *C*, near its front end, through which the lower end of a connecting-rod, *D*, is passed. The upper end of the connecting-rod *D* is attached to the forward end of a lever, *E*. This lever *E* is pivoted to a plate, *F*, provided with lugs or bearings *f*, which is suitably secured to the top of the car. The rear end or handle of the lever *E* is capable of being placed in notches formed in a locking-plate, *G*, attached to the top of the car *A*, as shown. The lower forward end of the bumper *B* is provided with a lip, *b*, upon which the forward end of a pivoted stirrup, *H*, rests when not in use. One side of the stirrup *H* is prolonged backward, and through its end the lower end of a connecting-rod, *I*, is passed. The upper end of this rod *I* is attached to the forward end of a lever, *J*, which is

pivoted upon the top of the car in the same manner as the lever E. The side of the locking-plate G adjacent to the pivoted lever J may also be provided with notches for the reception of the handle of said lever. The connecting-rods D I are respectively provided with a projection, *d i*, through which the inner ends of levers K L are passed. These levers K L are pivoted to the end of the car at each side and at such distance above the bumper B as to be within easy reach of the operator when standing upon the ground. The longitudinal movement of the coupling-link M, which may be of any suitable construction, is limited in the bumper B by a partition, *e*, formed in said bumper. This partition *e* is preferably concaved or rounded to correspond with the end of the coupling-link. The link M may be guided into its proper position in the bumper of an approaching car by raising or lowering the stirrup H, which is accomplished by a proper manipulation of either of the levers J L. When the locking-plate G is provided with notches in its side adjacent to the lever J, the stirrup H, and consequently the link M, may be kept in any desired position by forcing the handle of said lever into the desired notch. It will be seen that by this arrangement cars of unequal height may be as readily coupled as those that are equal in height. The uncoupling of the cars may be effected by oper-

dimensions, suffer untold tortures during their journey by rail, and the result is plainly apparent at the conclusion of the trip, when, if current official reports may be quoted, the average shrinkage in weight of each animal is found to vary from 10 to 15 per cent. That is to say, an animal will get into a car at Chicago weighing 1,400 pounds, take a five days' ride to Watertown, and upon arrival at the latter place tip the scales at from 1,190 to 1,260 pounds. This matter of shrinkage is the cattle shippers' greatest bane; it means not only lighter but unhealthy cattle. Indeed, upon this point, Dr. F. H. Hamilton, of New York, has written that "there can be no doubt that the

MENTAL AND PHYSICAL SUFFERING

necessarily incident to these conditions render the meat of such animals decidedly unwholesome." To obviate this evil, much labor has been expended and many experiments have been made during the past years. The Society for the Prevention of Cruelty to Animals has constantly stimulated inventors to work in this field, and it is fair to say that its efforts have been recognized as tending toward the best interests of both shipper and consumer. One of the latest inventions in the line of stock cars arrived from Chicago at the Watertown stock yards recently, where it was exhibited by the patentee and inventor, Mr. George D. Bur-



THE BURTON STOCK CAR.

ating either of the levers E K so as to raise the hook C from its engagement with the link M. By forcing the handle of the lever E into one of the notches in the locking-plate G the hook C may be firmly secured in either a raised or lowered position. By the construction and arrangement of these devices it will be observed that the coupling and uncoupling of the cars and the guiding of the link to its proper position may be effected from either the top or side of the car with equal facility and without any accompaniment of danger to the operator. Instead of the hook C, a coupling-pin or bolt of any desired construction may be used. The device is especially adapted to freight and other like cars; but it may be attached to any description of car with but little alteration.

Successful and Interesting Trial Trip of a New Cattle Car.

The humane transportation of cattle has for many years been a matter engaging the attention, not alone of dealers, shippers and the various anti-cruelty societies, but the general public as well, for the consumer is certainly a vitally interested party. It has long been conceded that the general methods in vogue of bringing cattle to market are of a primitive nature, and so inhuman and brutal that it is not surprising that the law has often been directed to the evil, and protective measures sought to remedy it. From Chicago to the various markets of the United States vast numbers of live cattle are shipped yearly. These animals, huddled together in ordinary stock cars of insufficient

dimensions, suffer untold tortures during their journey by rail, and the result is plainly apparent at the conclusion of the trip, when, if current official reports may be quoted, the average shrinkage in weight of each animal is found to vary from 10 to 15 per cent. That is to say, an animal will get into a car at Chicago weighing 1,400 pounds, take a five days' ride to Watertown, and upon arrival at the latter place tip the scales at from 1,190 to 1,260 pounds. This matter of shrinkage is the cattle shippers' greatest bane; it means not only lighter but unhealthy cattle. Indeed, upon this point, Dr. F. H. Hamilton, of New York, has written that "there can be no doubt that the

of Boston. Quite a large party of cattle men and newspaper men were present, and Mr. Nathan Appleton of the anti-cruelty society was among the party who drove out to the stock yards. Mr. Burton's car is probably 50 feet long, 14 feet shorter than an ordinary passenger car, and about as many longer than the common cattle car. It is divided into three compartments, and in each compartment six cattle are placed, the animals standing lengthwise in the car, three being placed in each of the two stalls into which the compartments are sub-divided. Thus each car carries 18 cattle, and there is ample room for the animals to lie down, a point in which the ordinary box car appears to be sadly deficient. Perhaps the most noteworthy and ingenious feature of the car is found in its feeding arrangements. Nowadays it is customary in shipping cattle to feed and water them at convenient stations, no fodder being taken on the journey. It is probable the poor creatures would fare very poorly but for the legislative enactments in various States, which compel shippers to make stops of several hours' duration, during which the cattle must be unloaded and fed. The car on exhibition, however, is fitted with 18 feeding bins, opening into convenient troughs and operated by a lever from the top of the car, the heads of the animals having been previously secured through stanchions, also operated from the top of the car. Each feeding bin has a capacity of two bushels, and the lever is ingeniously operated to measure, through feed spouts, exactly two quarts at a stroke. Hay is also carried in a separate part of the car, and is fed into the troughs through side-traps. A water-pipe running along

THE CENTER OF THE CAR

has outlets at each stall, and each water-trough is provided with a waste pipe, to obviate the overflow. Water is obtained from the roadside water crane common to all railroads. This, briefly, completes the mechanism of the car. The item of time saved in feeding the cattle in transit is alone claimed to be a vastly important one. All the improvements shown are of a decidedly humane nature, and the car was inspected with the liveliest interest by the fifty or more gentlemen at the stock yards. The car, it appeared, was loaded at the Union yards, Chicago, eighteen cattle, with a net weight of 24,200 pounds (or an average of 1,344 pounds), entering the car and being secured, the operation of loading occupying less than twelve minutes. The trip was made over the Grand Trunk line, and the cattle were not unloaded until their arrival at Watertown, Mass., this period of transit including a "side trip" to Keene, N. H., under Mr. Burton's direction. Agent Chaffee, who accompanied the car, was enthusiastic in his praise, and claimed that the feeding arrangements were simply perfect, working throughout without a hitch of any description. The animals frequently laid down during the trip, and, at Lansing, Mich., the entire eighteen head were placidly reposing. Arriving at Watertown, the unloading began. In spite of the adverse prediction of several cattle drivers, not the slightest difficulty was experienced in this regard. A movement of the lever connected with the stanchions unloosened each animal, and they trotted out of the car and into the stock yards in less than five minutes, looking remarkably bright and moving with spirit. The question of shrinkage was next brought up, and, in accordance with cattle customs, the eighteen head were weighed, when it was found that the net weight was 23,850 pounds, or an average of 1,325 pounds. The average shrinkage after a six-days' journey thus appeared to be only 1.3 per cent. The trip was certainly a successful one, productive of some significant results, and, if the predictions of the cattle men amount to anything, the old box cars will soon have seen their last day.

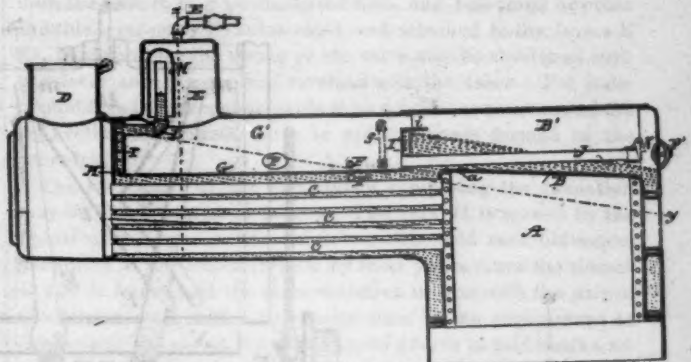


SOME of the worst railway accidents which have occurred after dark have been traced to the inability of the engine-driver to distinguish a red from a white light—an optical defect known as "Daltonism." An accident from this cause ought, in future, to be an impossibility, for Mr. Andrew W. Tuer ("Bartolozzi" Tuer) and Mr. James Cleminson, a well-known railway engineer, have conjointly invented a new system of railway signalling, consisting mainly in continuing at night the use of the ordinary day semaphore signal, the arms or pointers being boxed and illuminated internally, so as to form a broad and continuous band of white light, the position, as by day, determining whether the road is clear or blocked. The new signal can naturally be seen from a much greater distance than a single red or white light, and it is obvious that its meaning could only willfully be misinterpreted.—*London World.*

Improved Steam Boiler.

PATENTED JANUARY 30, 1883.

MANUFACTURED BY THE GEISER MANUFACTURING COMPANY, WAYNESBOROUGH, PA.



THIS valuable improvement in steam boilers is the invention of F. F. LANDIS, of Waynesborough, Pa., and relates more particularly to improvements in steam boilers for traction-engines, or boilers subjected to motion and changes in their level; and the objects of these improvements are to produce a boiler that can be easily taken care of by inexperienced persons, and at the same time possessing several requisites—viz: lightness and great strength, containing water covering the crown-sheet to a good depth, whatever may be the level of the boiler in descending hills. The claim includes, in a steam boiler constructed with flues, a compartment having a floor located above said flues only, and having a rear partition or head adapted to retain a body of water upon the crown-sheet when descending a grade; in a steam boiler, a front and a rear compartment separated by a chamber under the steam-dome, said compartments communicating with each other and with the steam-dome, substantially as shown in above drawing, a front and a rear compartment separated from each other by a flanged head provided with a supply-pipe, having a valve; in a steam-boiler constructed with flues, a chamber located above the flues, provided with a feed-water pipe and its front partition provided with a steam-pipe, leading to the dome, and a rear partition provided with a water-circulating pipe; in a portable or traction-engine steam boiler, the combination of a fire-box, a chamber above the same, having a water-communication with the flue-compartment and a steam-communication with a second chamber located above the flue-compartment, a steam-pipe leading from the latter, and a deflecting-bell; by this valuable patented device the greatest difficulty experienced in the successful operating of road engines has been overcome, as it has been thoroughly tested on steep grades and found to hold the water on crown-sheet of the boiler, and rendering it perfectly safe to the operator of the engine. As a step in advance of any we have heard of it is destined to be of great importance to persons using this class of engines, and will no doubt be the means of a large increase of trade for the company who manufacture this style boiler. For further information the reader is referred to the Geiser Manufacturing Company, Waynesborough, Pa., who also manufacture engines, boilers, saw-mills, road locomotives, grain hoisters, horse-powers, etc.

THE railway viaduct at Garabit, in France, now being erected over a river in the department of Cantal, has a total length of about 1,880 feet, and near the middle of the great center arch, which is one of the noteworthy features of the structure, the height from the bed of the river to the rail is 413 feet. The viaduct was commenced in 1881, and is to be completed next year. The cost is estimated at about \$600,000.

New Reversing Gear for Steam Engines.

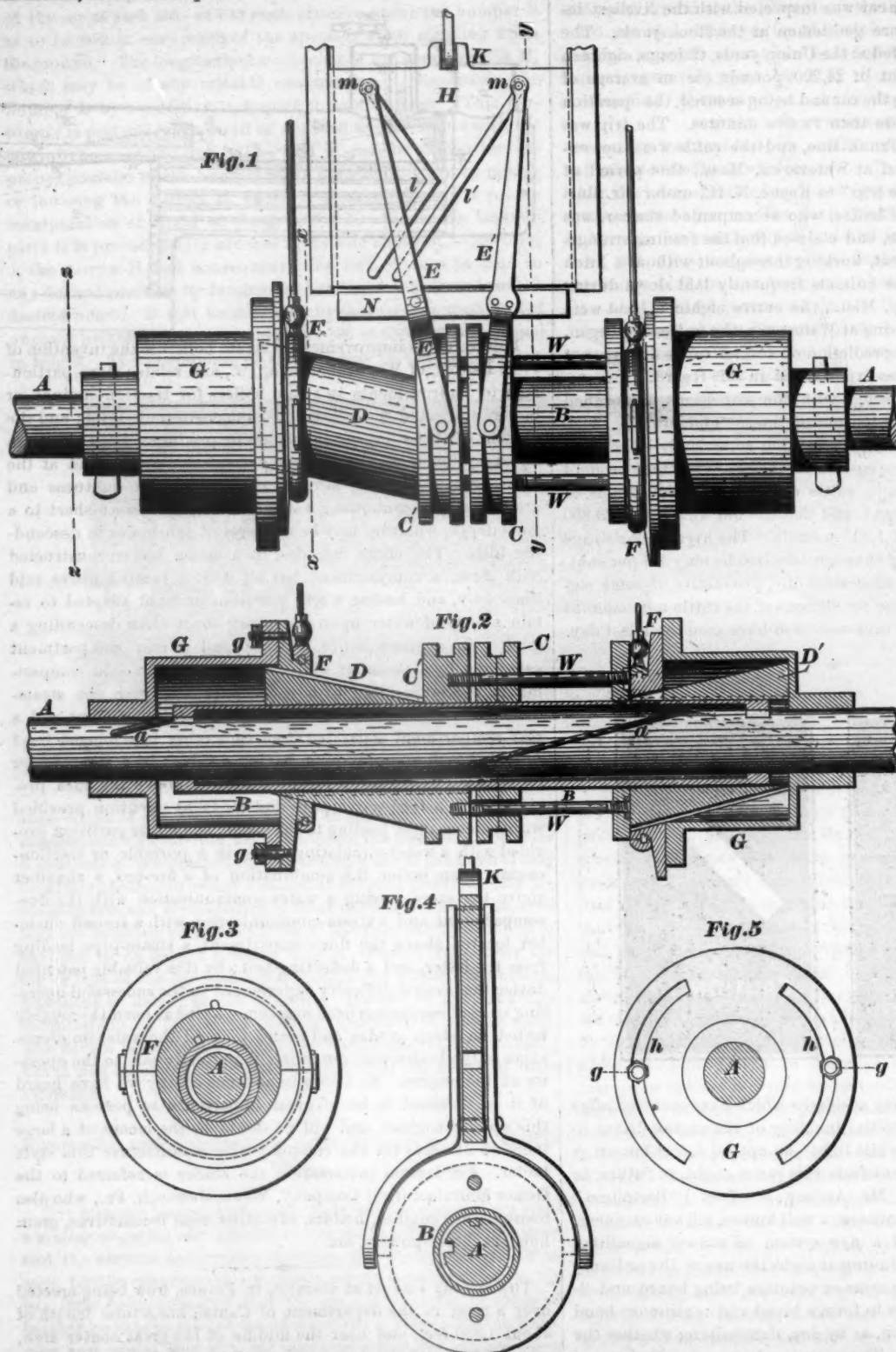
THE machinery described in this article and illustrated by the accompanying engravings, is the invention of FREDERICK ROCK, of Homer, New York, who is the assignor of one-half to William Hitchcock, of the same place.

may be used expansively at any time when the full stroke is unnecessary.

It consists essentially of a spirally-grooved driving-shaft, a cylindrical sleeve adapted to engage the groove of the former, and an oblique cam-sleeve adapted to engage the first-mentioned clutch and act upon the incline-plane or wedge principle and convert a concentric collar into an eccentric, the combined parts mentioned having the function, under the influence of the operator, through the agency of a grooved rack and certain levers to arbitrarily affect the valve and give to the same the required throw.

Figure 1 is a plan view, showing the various parts composing the improvement. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a transverse section on line *xx* of Fig. 1. Fig. 4 is a transverse section on line *yy* of Fig. 1. Fig. 5 is a transverse section on line *zz* of Fig. 1. Similar reference letters denote like parts in all of the figures.

A is the driving-shaft of a locomotive-engine, provided with a spiral groove, *a*², which runs about its contour, groove need not run entire length of shaft, 6 inches on each end is enough. B is a cylindrical sleeve, which fits upon the shaft A, provided with a spline within, adapted to fit in the groove *a*² of the shaft A. This clutch has a feathered key adapted to fit a key within a groove or key-seat provided in a second sleeve, D, which serves the purpose of a cam. The sleeve B has a collar, C, provided with an annular groove adapted to receive the lugs of the lever E¹. D is a second sleeve, preferably cylindrical in general form and oblique to the axis of the spirally-grooved shaft when in position over the latter. It is provided with a collar, C¹, having an annular groove, also adapted, like the sleeve B, to receive lugs in the yoke of a lever. F is an eccentric, formed with a flange, which, when in place,



Mr. Rock's invention is an improvement in what is known as "reversing-gear" for locomotive and other engines, and its object is to supersede the link-motion or other devices used for reversing or shortening the travel of the valve to cut off steam at different parts of the stroke of the piston, in order that the steam

may be used expansively at any time when the full stroke is unnecessary.

rests against a flange on an eccentric-guide. In this flange are secured bolts intended to pass through certain slots provided in said eccentric guide to secure the corresponding flanges together.

The eccentric F is provided with an oblique opening to receive the oblique portion of the clutch D, for a purpose to be hereinafter mentioned. G is a hollow cup-shaped wheel or housing, provided with a flange, and a hub all cylindrical in form, which, when in position, fits over the shaft A, to which it is keyed, and forms a hollow space for the reception of the sleeves D and B when it is desirable to reverse or shorten the stroke of the valve. H is a flat piece of metal adapted to fit loosely and move between the divided arms of the levers E E'. It is provided on its longitudinal edges with V-shaped grooves, adapted to move in ways with edges correspondingly shaped, and rendered in some suitable manner adjustable, to provide against frictional wear. This rack has formed through its body slots to receive the rollers fixed in the ends of the levers E E'. One of these slots is straight and oblique, preferably, to the longitudinal axis of the said rack, and the other V-shaped, preferably. As shown in the drawings, one arm of the slot I is nearly parallel to a slot shown and the other inclines in an equal angle in the opposite direction; but this is not essential, as their relative forms with relation to the longitudinal axis of the rack may be varied to suit circumstances. The lead given to the valves is determined by the shape of the slot I, in the rack. This may also be effected by making the spiral groove of the shaft serpentine, as well as spiral, in which case the long slot in the rack would remain straight, as shown. The connecting-bearing of lever E runs in the groove or slot I, while that of the one E' runs in the slot I'. The levers E E', which are acted upon by the rack H, and which operate the clutches B and D, have each a yoke provided with pivoted square bolts, or round bolts provided with anti-friction rollers, which run in their respective grooves in sleeves B and D. The bifurcated arms of levers E E' are closed by bolts covered by anti-friction rollers which take into their respective slots, as before stated. When the said bearings or rollers are at the near ends of the slots they give full stroke to the valves, and when at the middle points between the two ends the valves are on the centers of the engine. The cab-lever, within reach of the operator, is attached to the clevis K of the rack H. N is a bar secured to the frame of the locomotive, which has formed in it segmental slots. Rivets pass through these slots and connect the two limbs of the levers E E', to form changeable fulcrums, so that, if necessary, a slight play may be allowed to said levers to assist in keeping the friction-rollers of the yoke in the center of the shaft. The bolts in the ends of the lever-arms traverse their respective slots as the rack H is moved back and forward, and cause the lugs in the yoke to follow or move longitudinally over the center of the shaft A. The sleeve B is provided with a lug or spline, which engages the spiral slot of the shaft A, whereby the said clutch is caused to revolve with said shaft, carrying with it the eccentric to the desired point to reverse the engine. The sleeves D are provided with keys to engage the key-seats of the eccentrics to prevent the latter from turning on said clutches. The eccentric-guide G is provided on its front face with slots through which bolts run, the extremes of which slots arrest the motion of the eccentrics. When the bolts are at the ends of the slots the valves may run at full stroke, and when so running said eccentrics are driven by the eccentric-guides, so that the sleeves B and D are relieved of the strain. When the bolts of the eccentrics move toward the centers of the slots to shorten the strokes of the valves the sleeves take up all lost motion before moving the eccentrics and bring the latter to the center, thereby taking up what lost motion there might be, so that the rim of the valve cannot be affected. The sleeves B and D when moved run into and out of opening of the eccentric-guide G. The eccentric F is provided with an annular flange to receive the straps. In the key-seats of the eccentric, are run

keys, which hold said eccentric from turning, as before mentioned. The eccentric-guide G is fixed to the driving-shaft A by a suitable key. In the application of the invention to locomotive or other double engines, the opposite cam-clutches are connected by rods W, although, if preferred, they may be connected by a suitable sleeve. In order to work the valves for independent lead, the rack H may be dispensed with, and bell-crank or other suitable levers may be substituted and attached to the levers E E', in which case the stroke of the valve may be shortened with one lever and the engines reversed with the other. For independent lead the eccentric-guide slots must be concentric and the connecting-bolts must move in radial grooves formed in the eccentric.

The movement of the mechanism composing the invention may be briefly stated as follows: The rack H is moved by the operator who handles the cab-lever. The said rack influences the levers E E', which in turn by their yokes move the sleeves B and D in one and the same direction in line with the axis of the driving-shaft, while at the same time by the engagement of the keys of the clutch B and the spiral groove in said shaft a rotary movement is given to the said sleeves. The cam-clutches D in their axial movement convert the concentric collars into eccentrics, and as the former are united to the latter by splines or lugs they take the same rotary movement that is given to the said sleeves by the said groove in the shaft. The sleeves D move into the eccentric-guides G, which latter remain stationary, being keyed to the grooved shaft, and their eccentric grooves or slots guide and limit the movement of the said eccentrics. The eccentrics are connected to the valves in the usual manner. When the driving-shaft of the engine moves, it rotates all of the parts placed about its axis.

Among the advantages that may be named for the invention are the following: The first cost of the construction will not exceed that of the link devices, and, being free from wear, repair expenses will be much less than attend the use of any link devices. There are no parts in motion while running, and consequently the durability of it is assured. It has few parts, and these are large and simple, consequently no special tools or machines are required. Direct connection being established with the valves, the least variation given in handling will be immediately felt, and the arrangement of the parts is such that no lost motion can affect the absolute perfection of the valve motion. The amount of lead given to any and all engines is optional with the builders and varied at the will of the engineer when driving loads of different weight; or the same lead may be made to follow the valve throughout its whole travel, whether long or short, and equally perfect upon the reverse or backward motion of the engine as the forward. Therefore, if the engine is for one class of labor only, the valve may be made to carry the same lead throughout, or lead may increase as may suit the fancy of the several builders. The engine doing labor of varying loads may be arranged to accommodate its valve-lead to the variation, at the will of the operator, if absolute lead is required, or if variable lead is required by my improvements, and each will be perfectly duplicated upon the reverse or backward motion of the engine.

New Postage Rates.

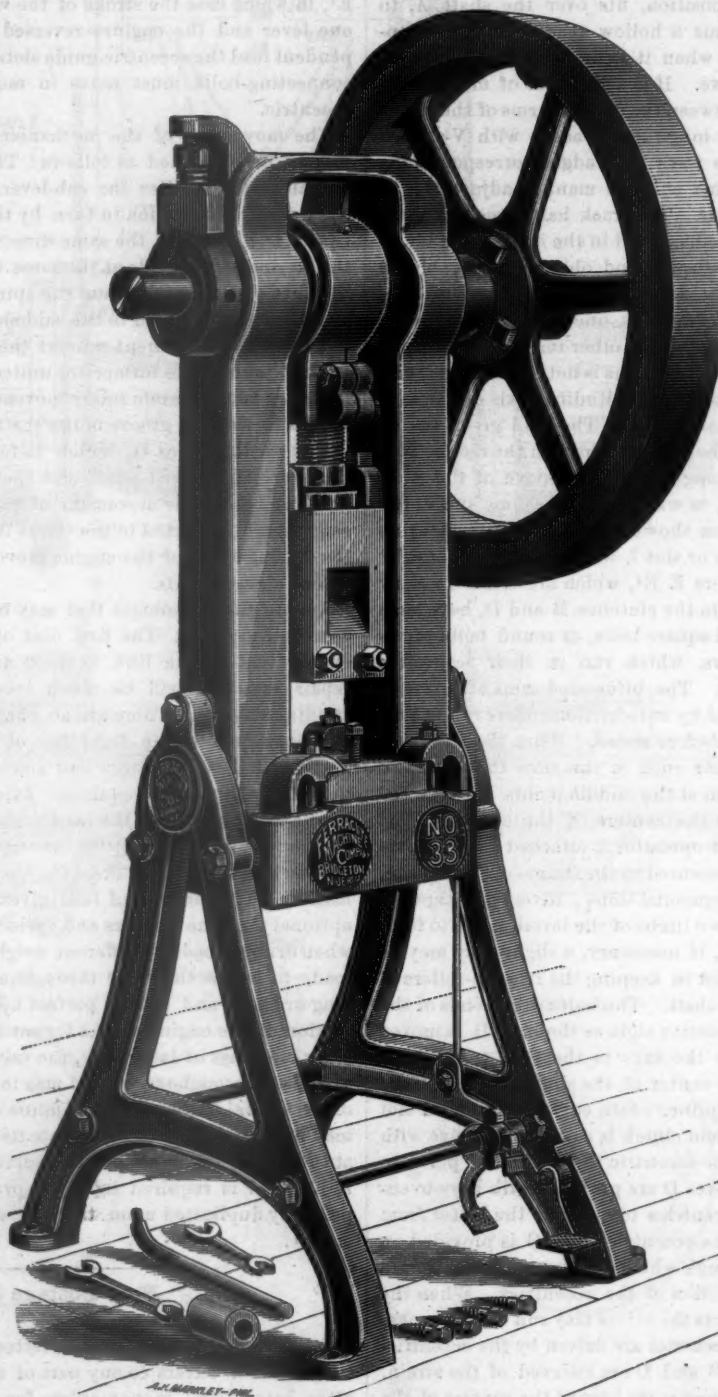
On and after October 1, 1883, letter postage will be uniform at two cents for letters to any part of the United States. On and after July 1, 1883, money orders for \$5 and under may be obtained for three cents. The order will be payable to bearer, and will be good for three months from date of issue; after that time the holder can get par value only by applying to the department at Washington. On the same date, the rate of money orders on all sums will be changed, and not exceeding \$10 be procurable for eight cents, and from that to \$100, the rate increasing up to 45 cents.

Embossing Power Presses.

The press illustrated is the third in a series of four sizes (counting from smallest to largest), built by the Ferracute Machine Company, of Bridgeton, New Jersey. This style of press is adapted for such work as punching bar iron, washers, small nuts, etc., and for cutting out clock and gas-fixture parts, spoons, forks, jewelry, watch-cases, locks, brass goods, etc., and for embossing fancy work of various kinds, formerly done in drop presses. Press 33 is specially designed for cutting and forming watch-case covers and rings. All of these presses have solid columns, not cored out hollow, and are built very heavy and substantial in their working parts. Among their peculiar features may be mentioned: 1st, A new and improved automatic clutch, attached to both treadle and hand lever, very simple and durable, and so arranged that the shaft cannot make more than one revolution by one action of the levers. It consists of a lever or "button" connected with a sliding pin in the shaft. This pin engages with studs projecting from the fly wheel, which runs loose on the shaft when out of action. There being three studs in the wheel, the operator never has to wait more than one-third of a revolution for the press to start. The wheel pins have square heads, and can be revolved as they wear, thus giving greater life to the clutch than in other forms, and when worn out they are very cheaply replaced. This clutch is provided also with a "safety pin" to lock it, allowing the shaft to be revolved to any position, and the dies adjusted while the fly wheel is in motion, thus dispensing with the need of a counter-shaft. 2d, A reversible treadle lock, operated with the foot, by which the treadle can be fastened down for continuous running, or up for safety when the press is temporarily stopped. 3d, A treadle bumper and stop of India rubber for securing a noiseless and limited motion. 4th, An adjustable spring-brake which controls the motion of the press, and adapts it to various speeds. 5th, An adjustable ball and socket pitman, provided with an improved clamping device at upper end, thus avoiding the annoyance of loose joints incident to lock

nuts, and giving the pressure from shaft to dies practically through solid metal.

The weight of Press 33 (see cut) is about 2,700 lbs.; weight of fly wheel about 750 lbs.; diameter of fly wheel 39 inches; width of fly wheel 6 inches; stroke of slide bar (variable to order), 1½ inches; adjustment of slide bar, 3 inches; size of each column, solid iron, 4½x7 inches; breaking strain of columns, about 2½ millions of lbs. The smallest press of this series weighs about 800 lbs., and the largest 5,100 lbs.



EMBOSSING POWER PRESS.

The Ferracute Machine Co. manufacture about 75 sizes and kinds of presses for general sheet metal work, all of which are illustrated and described in their new catalogue which they furnish gratuitously on application.

Against Rust.

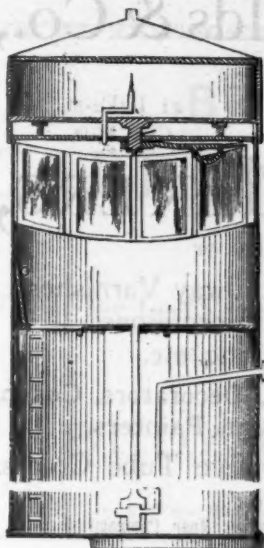
WHAT promises to be an invention of general utility has been patented in Germany, in the shape of a protective against rust. It is made in the following manner: The rough oils obtained in the dry distillation of certain bituminous substances, of which brown coal and peat are among the number, are distilled further, and into the oil thus procured one-quarter its quantity of rolled india rubber, cut into small strips, is thrown in and left for eight days. At the end of this time, the mass of oil and saturated India rubber is subjected to the action of vulcan oil, or something else having a similar effect, until thoroughly mixed into a uniform substance. If metal surfaces are thinly covered with this substance they are said to be perfectly protected against rust, and the process of oxidation is also said to be arrested and rust already formed removed, by the application of a thin coating of this mixture.

Another German patent protects the manufacture of a mixture of common linseed oil paint with ten per cent of burnt magnesia, baryta, or strontian, added to it while cold, along with a quantity of mineral oil. In the mixture thus formed, it is stated that the free acids of the paint are neutralized, and, on account of the lasting alkaline reaction, its use, as a coating on iron, is a protective against rust. To prevent iron placed in the earth from rust our Teutonic relatives are painting it with a mixture

of one-hundred parts of pine-rosin, twenty-five of gutta-percha, fifty of paraffine, and twenty parts of magnesia and mineral oil. Vaseline is found to prevent the drying of paint containing from twenty to thirty per cent of magnesia or burnt dolomite, used on some parts of machinery.

Parkhill's Watch Tower and Signal Lantern.

THE inventor of the new and ingeniously devised watch tower and signal lantern best designated by his name, is MR. CLAIR S. PARKHILL, of Hornellsville, N. Y., who has secured letters patent for the protection of his rights therein.



His invention relates to new and useful improvements in watch towers and signal lanterns, to prevent accidents at railroad crossings and other dangerous places, and consists in novel features of construction, combination and arrangement of parts.

The lantern or turret in Mr. Parkhill's invention stands on the top of the tower, and is supported and turned around by means of a pivot which extends through the ceiling of the watchman's coop. A lever is firmly secured to the lantern, which may be supported by four rollers run on a track on the floor. The sheet-iron frame of the lantern rests on arms which are bent to allow the turret or lantern to revolve sufficiently far to present or expose at will

either the word "Danger" or "Safety," without the possibility of the arms hitting a gas-pipe which passes from the coop below to the turret above.

The watchman's coop is reached by means of a ladder, through a trap-door raised and held open by means of a spring, and which, after the watchman has entered his coop, is closed and fastened in a position even with the floor, so that it can be walked upon. A trap-door in the ceiling of the watchman's coop opens downward and gives access to the turret. Inside the coop, directly overhead, is a lever—whose use will be explained presently—held at proper places by means of a spring bolt which catches into notches. Windows enable the watchman to see in every direction. Arrangements for his comfort are easily made by a small furnace in the compartments below the coop, or by means of a gas-stove within it.

Outside of the coop is a large gong, which is sounded whenever the turret is moved in any direction by means of the lever spoken of above as being inside the watchman's coop, directly overhead, and held at proper places by means of a spring bolt. Should the watchman need to sound the gong while the turret is stationary, he could do this by means of a crank inside the coop. Every emergency is thus provided for.

The room containing the ladder for the ascent of the watchman to his coop can be used for storing coal, flags and other things, and as a place of rest and shelter for switchmen. Of course, when the existence of this room would be needless and an impediment, the watchman's coop and the turret or lantern above could be supported on iron columns, made of sufficient height to enable the watchman to command an unobstructed view of trains coming from either direction.

We scarcely need add that an arm, beam, or any instrument to act as a gate across the street or sidewalk could be connected with the turret and lever working the gong, or either of them, and worked so as to be opened and closed, or raised and lowered

by the watchman in the tower independently, or with the turning of the turret and sounding of the gong.

The intention, simplicity and effectiveness of Mr. Parkhill's invention commend it to the attention of persons interested in the improvement of railroad construction.

Important to Carriage Drivers and Carriage Owners.

THOMSON'S Security Rein Holder, advertised in our columns, is one of those little conveniences which when once put into practical use, surprise us that we have so long been able to do without them.

Every horseman has been bothered to know how to secure the reins during his temporary absence from his carriage; and so great has been the need of some device for this purpose that over one hundred patents have been taken out in the last twenty-five years for Rein-Holders. Yet all these have been so awkward or inadequate that one rarely sees a Rein-Holder on a carriage.

Thomson's invention, however, seems to be all that is desired, and soon will be a necessary part of every carriage. It is warmly approved and is adopted by the celebrated Brewsters—the Brockett & Tuttle Co.—the Studebakers and many other leading carriage manufacturers.

For illustration and particulars refer to advertisement.

SCIENTIFIC men of all nations are invited to compete for the Volta prize—30,000f. or \$6,000—of the Academy of Sciences, Paris, which will be awarded in December, 1887. This prize was founded by the decree of June 11, 1882, and is for the discovery or invention of whatever shall render electricity applicable economically to one of the following objects: Heat, light, chemical action, mechanical force, the transmission of messages, or the treatment of sick persons. No attention will be paid to what may be sent in by candidates later than June 30, 1887.

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Harlan & Hollingsworth Co., Wilmington, Del.
Haskell & Barker Car Co., Michigan City, Mich.
Hazelton Car Works, Hazelton, Pa.
Indianapolis Car and Manufacturing Co., Indianapolis, Ind.
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Jones Car Manufacturing Co., Schenectady, N. Y.
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(ONLY PLACE OF BUSINESS.)

NOTE.—We have no connection with a Stock Company advertising itself as the "Old House."

THE SALMON CAR HEATER



"36 per cent of coal saved and the car kept noticeably warmer!"
by using **THE SALMON CAR HEATER.**

It Insures Safety from Fire in case of Accident,

Economy in Fuel and **RAPID CIRCULATION.** It heats quickly, is **SELF-REGULATING,** and can be used for either **STEAM OR HOT WATER.**

The Water Tubes do not come in contact with the Coals, but occupy the Smoke Flue in such a manner as to absorb the greatest amount of heat from Coal in a **low State of combustion** without danger of chilling the fire.

At the last "Mechanics' Fair" it received the Silver Medal, being the highest award to heaters of any kind.



CORRESPONDENCE SOLICITED.

The Salmon Car Heater Company,

OFFICE: 48 CONGRESS STREET, BOSTON, MASS.

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Are used to call attention to the fact that this is an advertisement of the **CHICAGO, MILWAUKEE & ST. PAUL RAILWAY**.

Its **EIGHT** Trunk Lines traverse the best portions of **Northern Illinois, Wisconsin, Minnesota, Dakota and Iowa**.

Located directly on its lines are the cities of **CHICAGO, Milwaukee, La Crosse, Winona, St. Paul, Minneapolis, Madison, Prairie du Chien, Mason City, Sioux City, Yankton, Albert Lea, Aberdeen, Dubuque, Rock Island, Cedar Rapids, and Council Bluffs**, as well as innumerable other principal business centers and favorite resorts; and passengers going West, North, South or East are able to use the **CHICAGO, MILWAUKEE & ST. PAUL RAILWAY** to the best advantage.

Ticket offices everywhere are supplied with Maps and Time Tables which detail the merits of the line; and agents stand ready to furnish information, and sell tickets at cheapest rates over the **Chicago, Milwaukee & St. Paul Railway**.

S. S. MERRILL, A. V. H. CARPENTER,
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THE ONLY LINE RUNNING THROUGH CARS

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Two through trains daily between New York City and all points on the Housatonic Railroad, from the Grand Central Depot via the New York, New Haven, and Hartford Railroad at 8:00 A. M. and 3:30 P. M.

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H. D. AVERILL, Gen'l Ticket Agent.
W. H. YEOMANS, Superintendent.

General Offices, Bridgeport, Ct., Dec. 27, 1882.



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PHILADELPHIA, BALTIMORE AND WASHINGTON,
WITHOUT CHANGE; connecting with through trains to Florida and all points South and West.
Train leaves Boston at 6:30 P. M. daily.

Leave Boston for Grand Central Depot, New York, at 9 A. M.; returning, leave New York at 11 A. M. and 11:34 P. M., week days. Pullman Palace Cars run through.

THE NORWICH LINE

—BETWEEN—

BOSTON AND NEW YORK.

Steamboat train leaves Boston 6:30 P. M., arrives at New London at 10:00 P. M., connecting with the new steamer **City of Worcester**, Mondays, Wednesdays and Fridays, and **City of New York**, Tuesdays, Thursdays and Saturdays. Returning, steamer leaves Pier 40, North River, New York, at 4:30 P. M., connecting at New London with train leaving at 4:05 A. M., arriving in Boston at 7:55 A. M. Good night's rest on the boat.

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"Under its present management

THE ERIE RAILWAY

is become the most progressive and reliable Trunk Line in America."—Cleveland Leader.

THE ERIE

is the **SAFE and COMFORTABLE** Line between the East and West. Its equipment is unsurpassed—Pullman Coaches, Westinghouse Air-Brake, Miller Safety Platform, Cars Lighted by Gas, Steel Rails, Double Track.

The scenery along the line includes such great Works of Nature as **Niagara Falls, Watkin's Glen, Portage Falls and Gorge, the Great Lakes and the Lakes of Central and Western New York**, making it truly the "LANDSCAPE ROUTE OF AMERICA."

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Specialties in Flock and Embossed Work, and Railroad
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Estimates and Designs furnished on application.



Patented
March 7, 1882.



Hundreds of accidents occur annually from loose
reins. When thrown over the dash or twisted
around the whip, they are often switched off into
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this avoided by using the

"SECURITY REIN HOLDER."

Holds the reins securely in position to be grasped
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Parties purchasing carriages can have the Rein Holder attached, without
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Wooden Turn-Tables; Car Castings, Railroad Forgings,
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We have in connection with our Car Works, a Foundry
and Machine Shop, and are prepared to do
a general Machine Business.

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PAPER CAR WHEELS,
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Works at Hudson, N. Y.; and at Pullman
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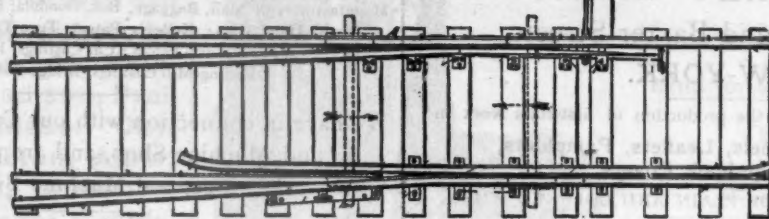
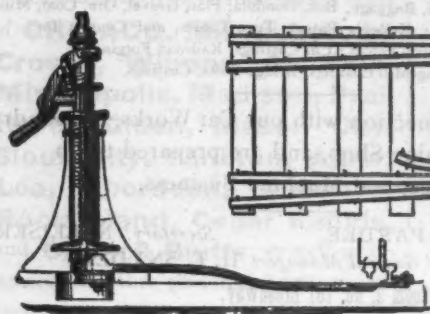
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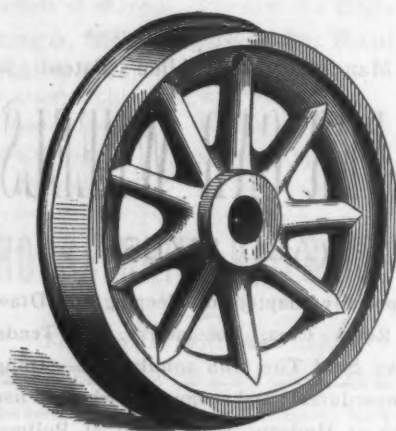


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Combining all valuable improvements.
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**PORTABLE Power Drill Presses,
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Operated at sight, and writes **FASTER and BETTER**
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PATENT****Practical Shaking Grate Bar,**

**OFFICE: 134 Water Street,
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The W. Ryder Double-Acting Grate Bars are so
constructed as to rest upon a frame with friction
rollers, and by means of a lever attached to the
front rocking bar, a reverse or reciprocal motion
is produced in each bar, which effectually breaks
up the clinkers, and removes all the ashes from
the bottom of the furnace.

By this means we get the largest percentage of
circulation of air, which keeps the bars cool and
prevents them from burning or warping. There
is also fully ten per cent of fuel saved, as it does
away with the necessity of opening the furnace
door and shaking the fire, and thus preventing
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This bar has two very superior qualities which
no shaking grate ever possessed. The first is a
large friction roller at each end of the bar, thus
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greatest ease, though the bar be ever so large and
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As the back reverses, it raises the front of the seat so as to prevent the passenger from slipping off of the seat, and removes the objection made to this kind of seat heretofore.

The large orders already received from the N. Y. C. and H. R. R. and other prominent Companies for our No. 8 Seat is the best guarantee of its merit.

Made with Perforated Veneer, Leather, Plush, and Rattan Seats, which are interchangeable: one kind of seat can be used in the Summer, and the other in the Winter.

Please send for Descriptive Circular giving full particulars and prices.

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Patentees and Manufacturers of

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STEEL

MADE ENTIRELY OF STEEL.

ONE MAN with it can easily move a loaded car.

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**GOLD, SILVER AND BRONZE MEDALS
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Scientific and Practical Tests by the ablest Scientists and carefully selected Committees.

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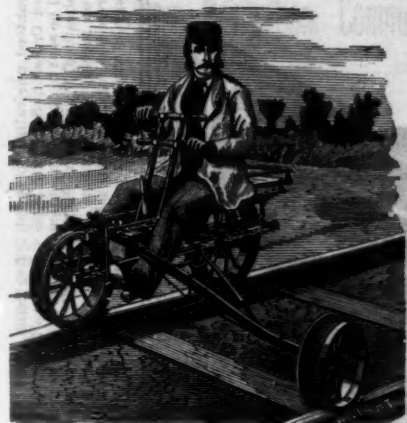
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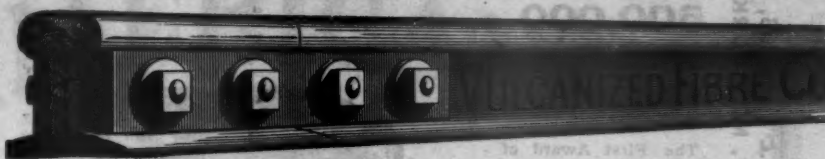
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Of the Finest Finish, as well as every description of CAR WORK, furnished at short notice and at reasonable Prices by the

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Will prevent Railroad Accidents and Save Life.**

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